Meeting Agenda

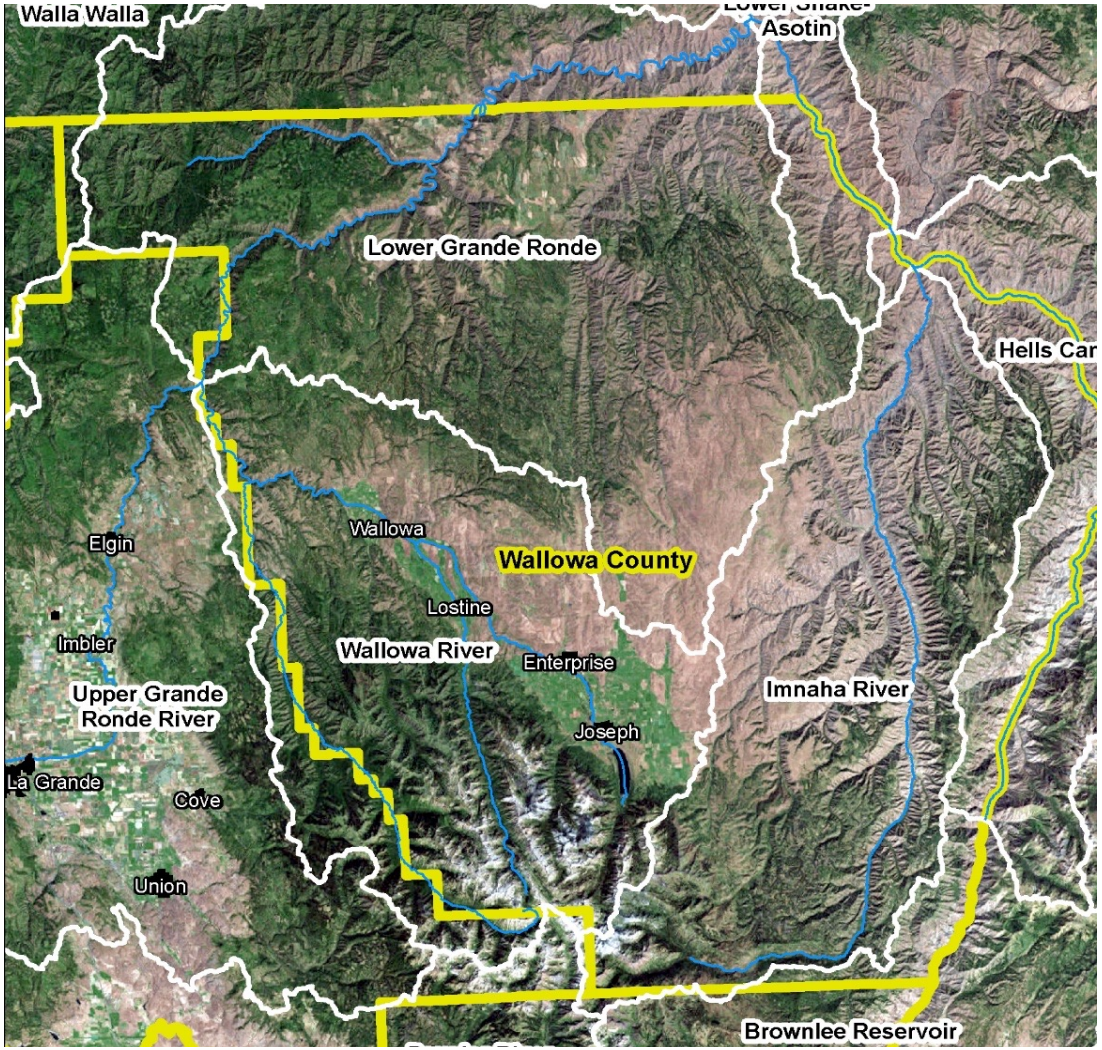
1. **Overview of report**
2. **Discuss Key Findings and Recommendations**
3. **Discuss edits / additions**
4. **Schedule**
5. **Next steps for stakeholders**

Report Outline

Executive Summary

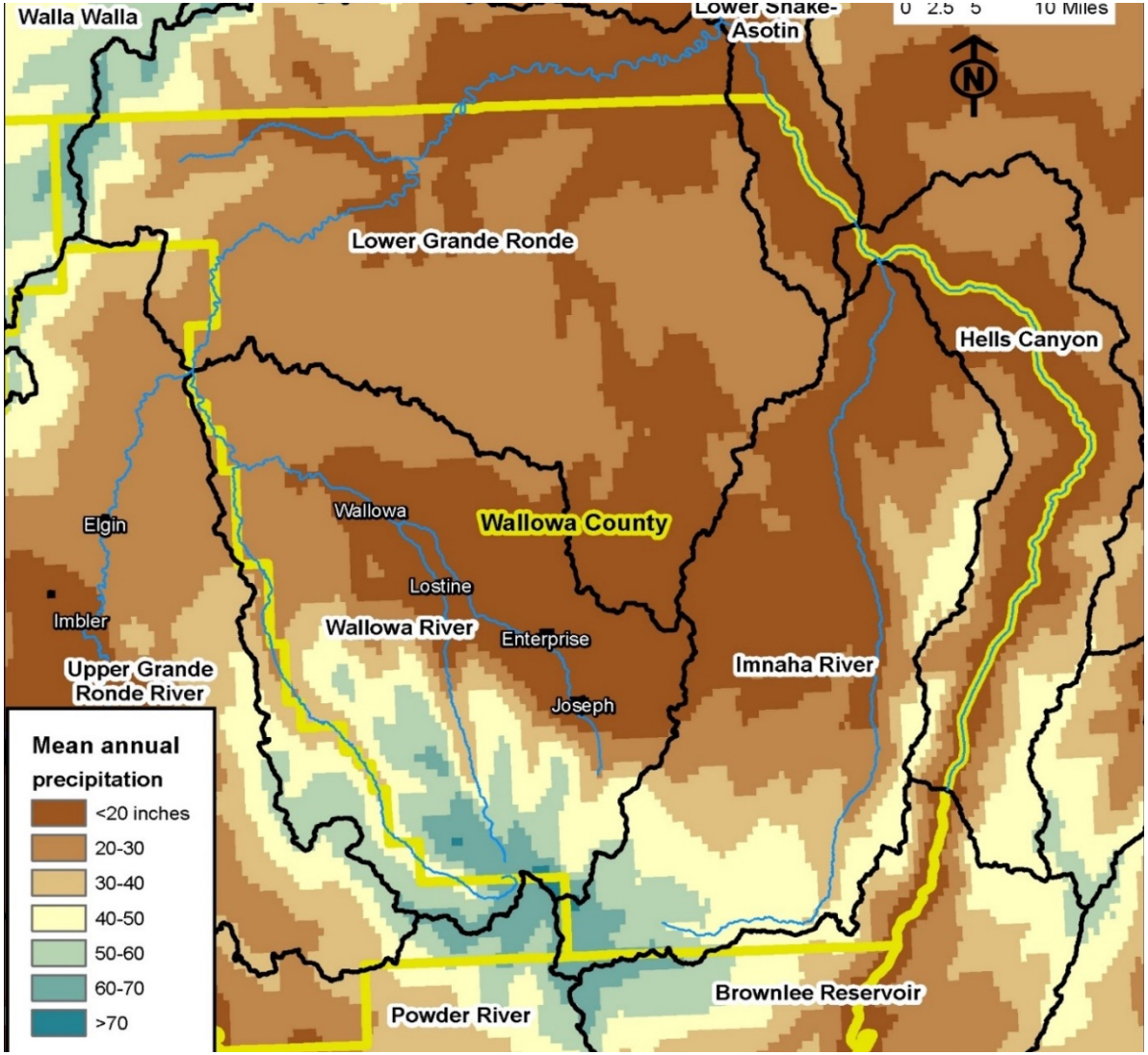
1. **Introduction**
2. **Historical Water Supply**
   - Precipitation, Temperature, Snowpack, Streamflow
   - Regression Relationships
3. **Future Water Supply**
   - Precipitation, Temperature, Snowpack, Streamflow
4. **Water Availability**
5. **Water Use and Water Rights**
   - Municipal, Domestic, Commercial, Irrigation, Instream, Scenic Waterways
6. **Key Findings**
7. **Recommendations**

1. Introduction



2. Historical Water Supply

2. Historical Water Supply - Precip



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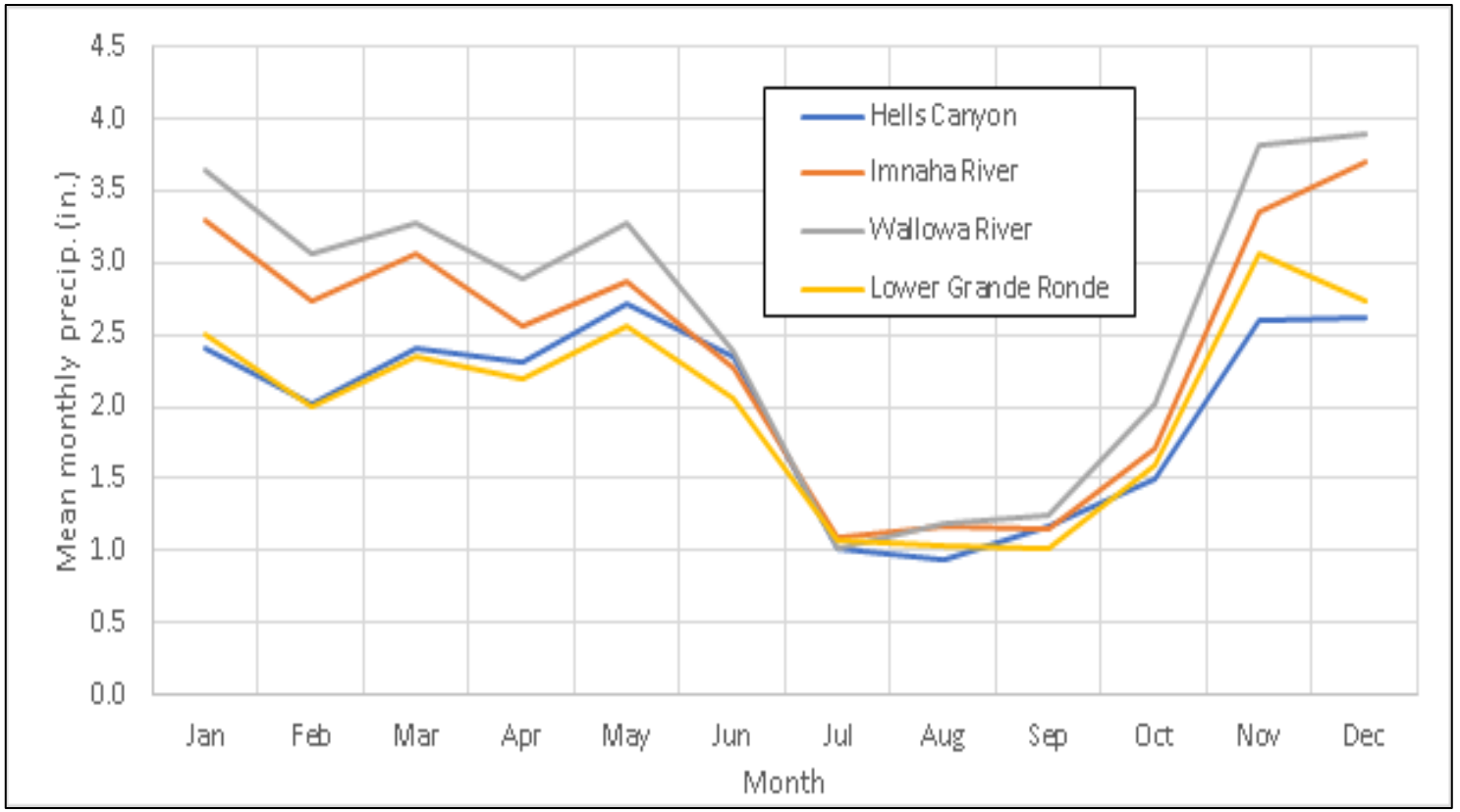

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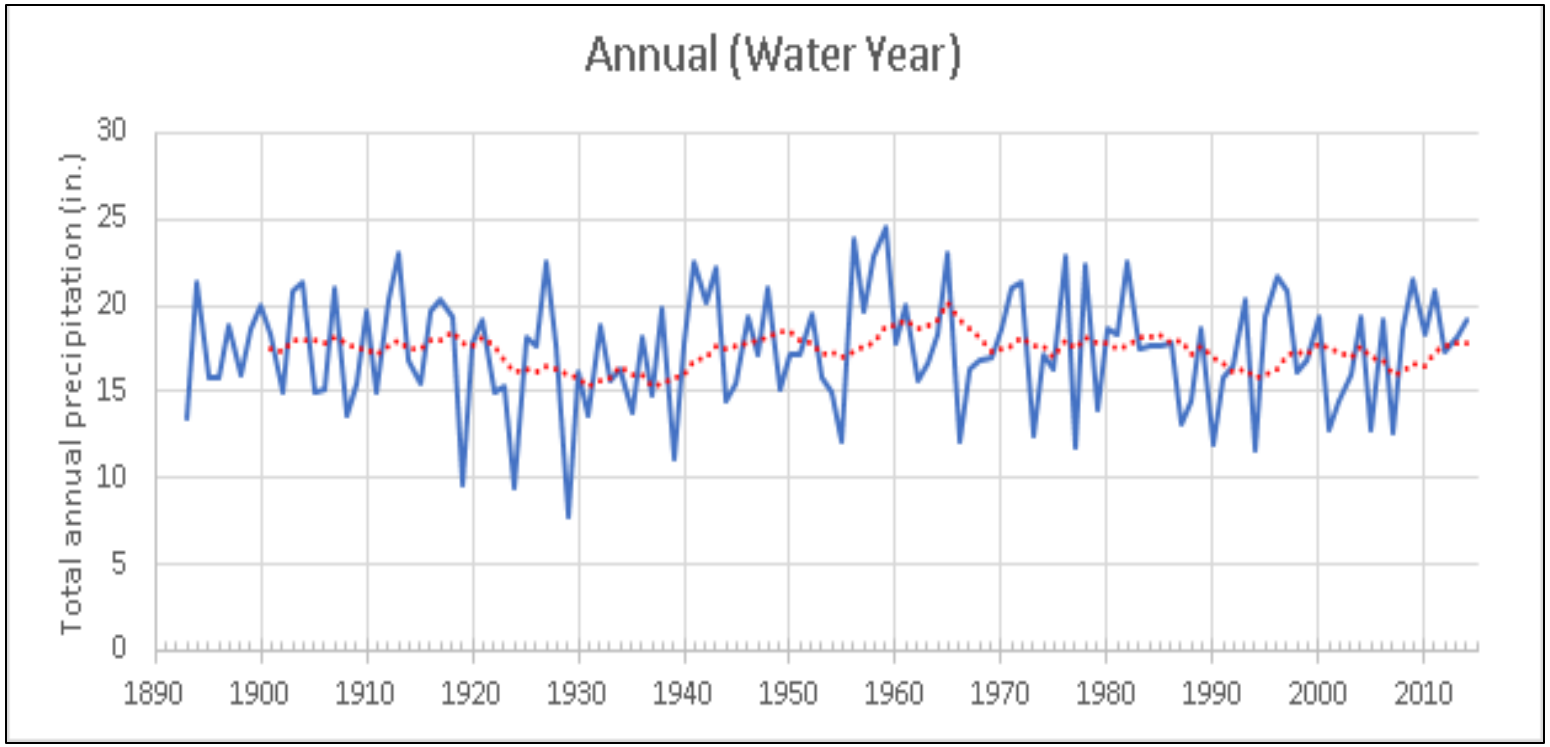

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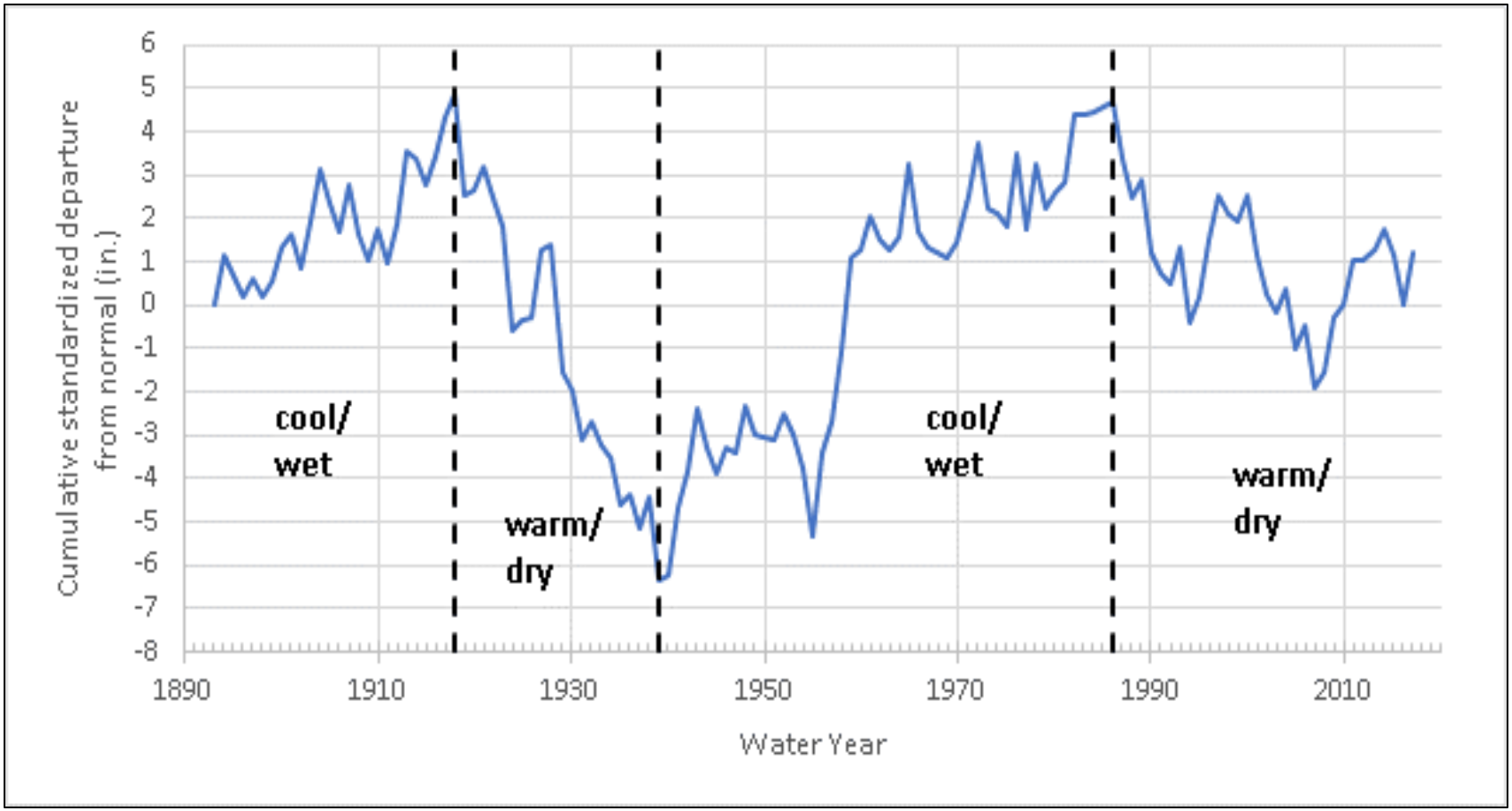
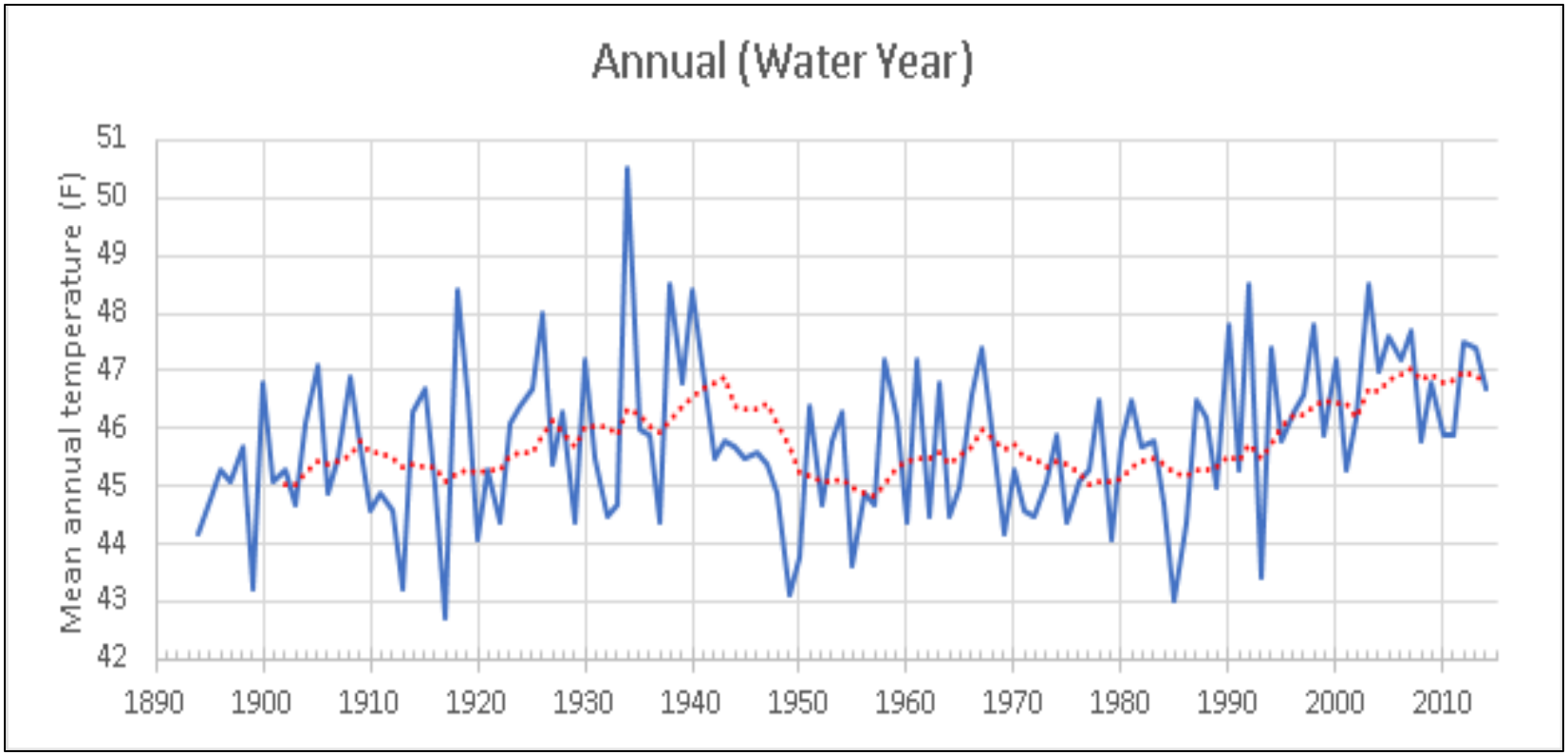
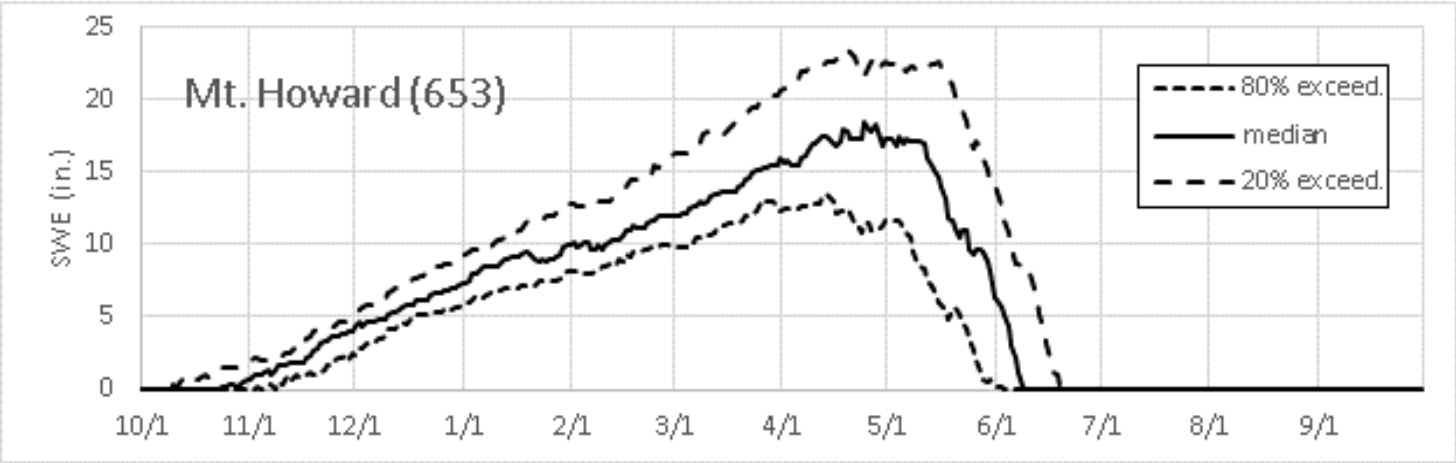
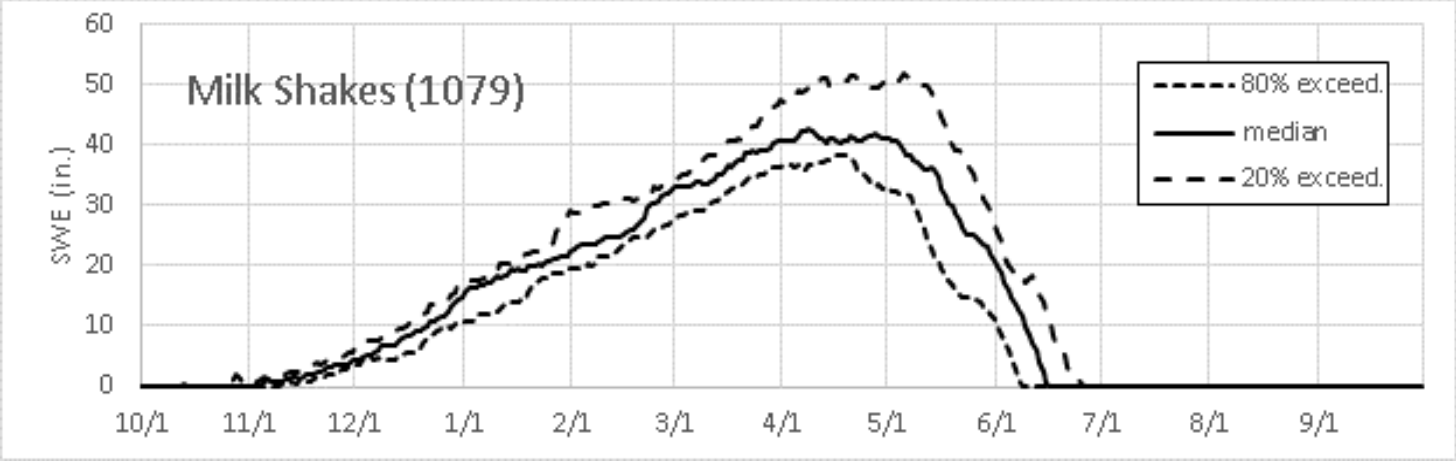


2. Historical Water Supply – Temp.



2. Historical Water Supply – SWE





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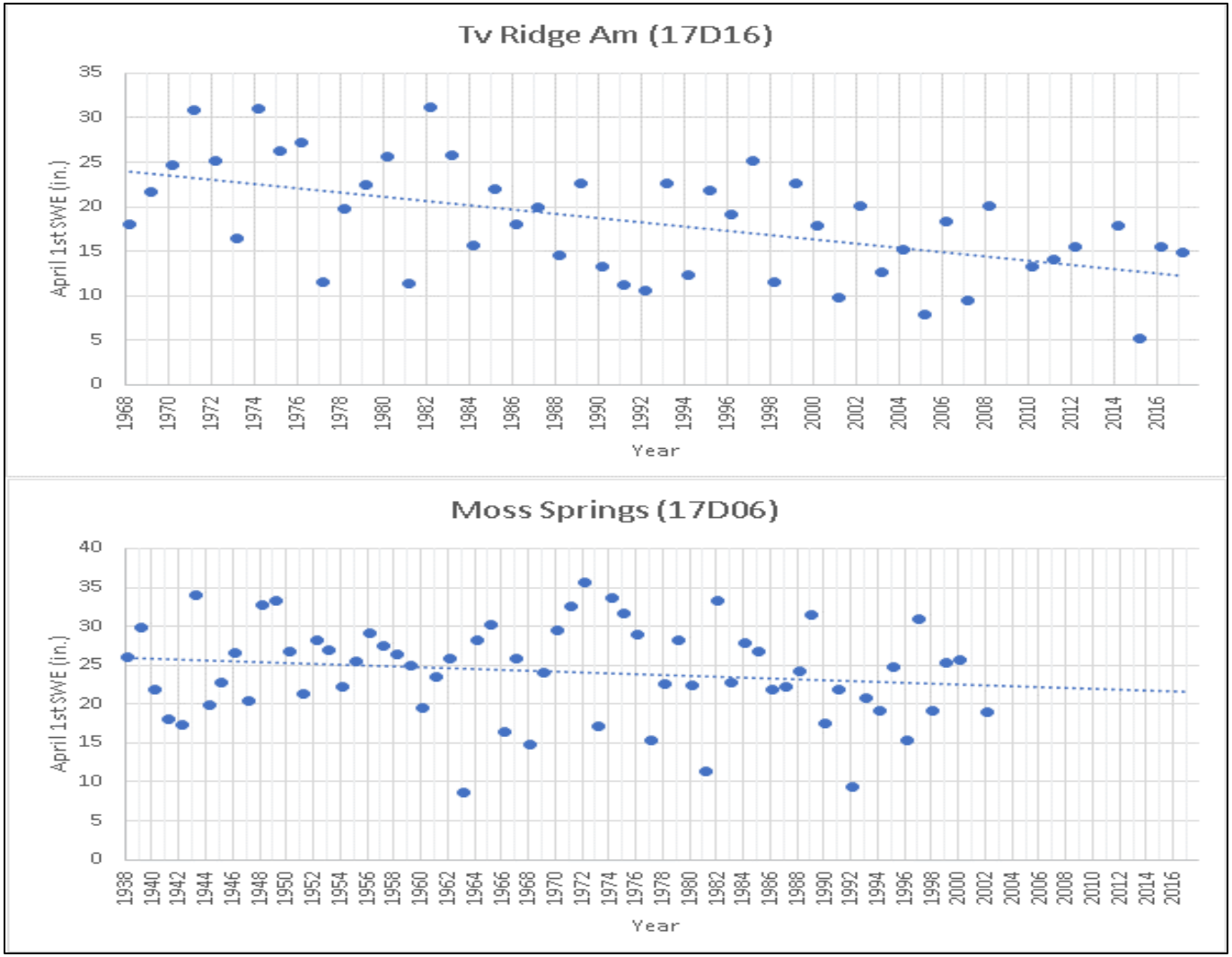
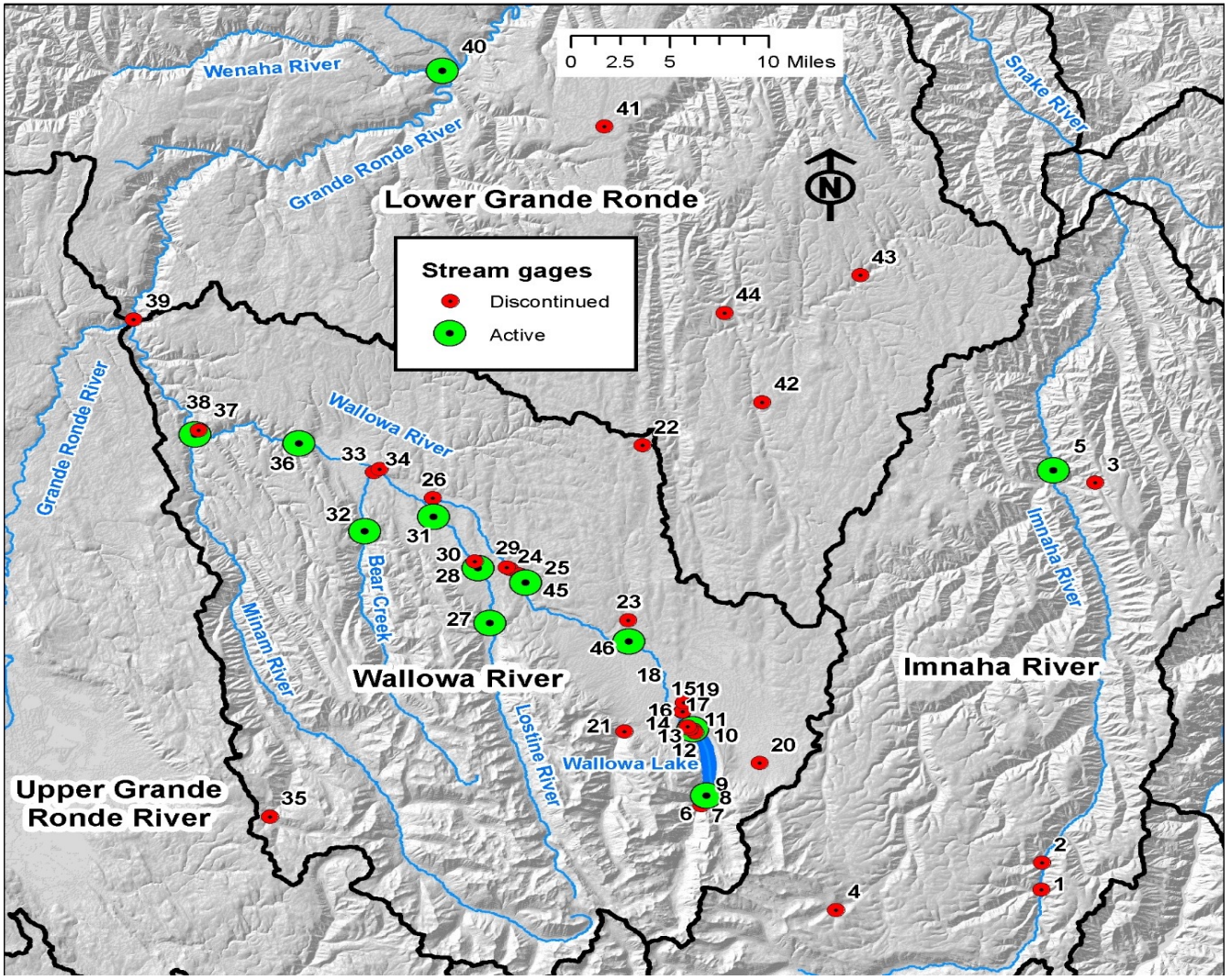


2. Historical Water Supply – Streamflow



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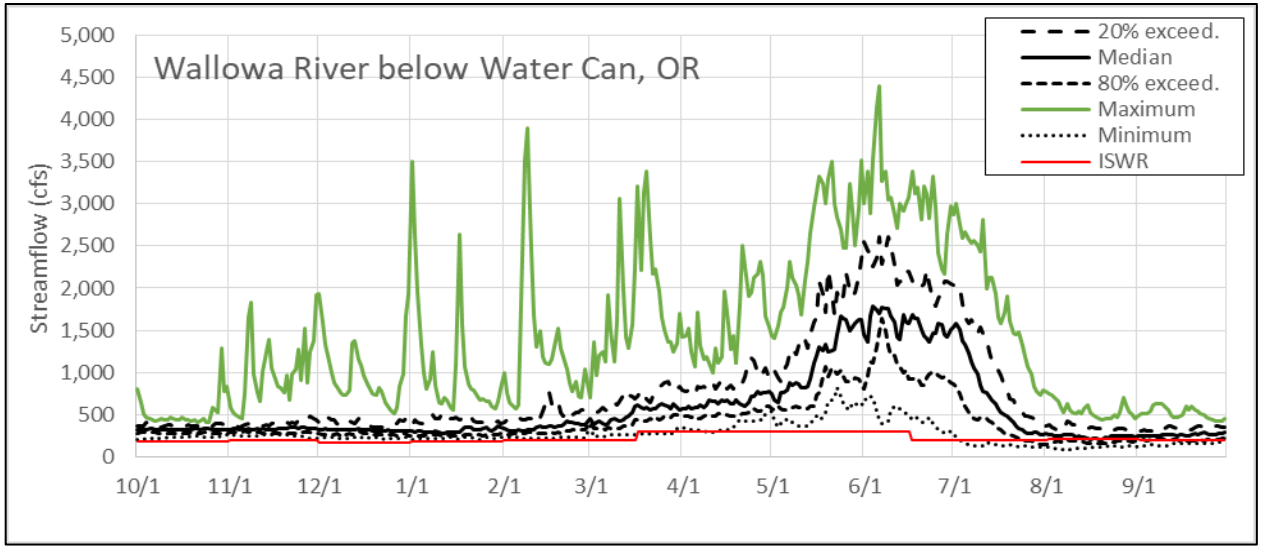

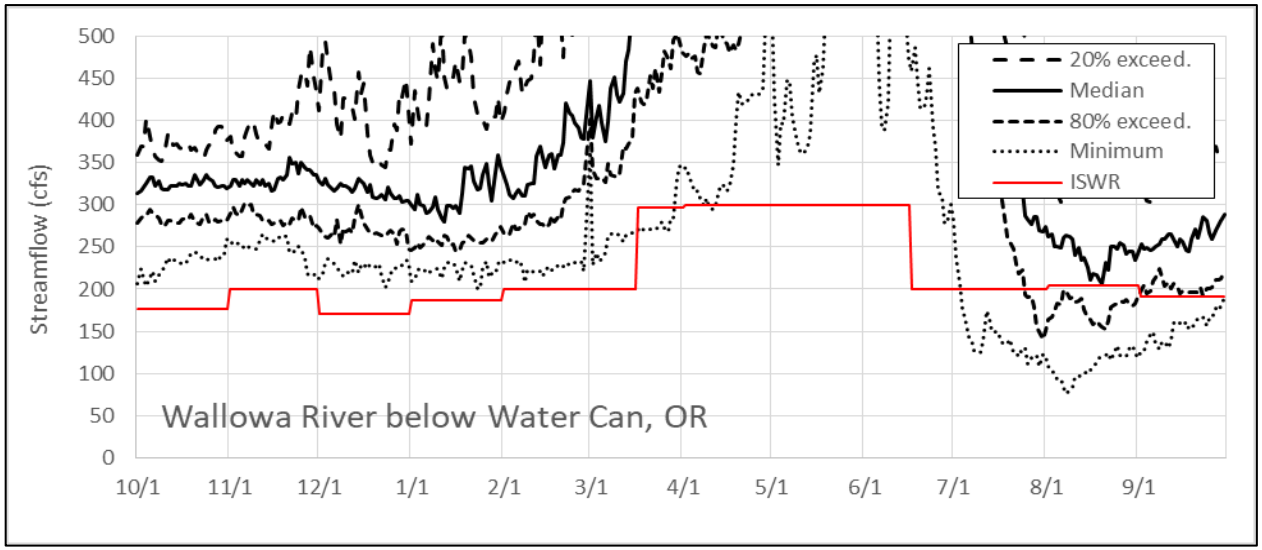

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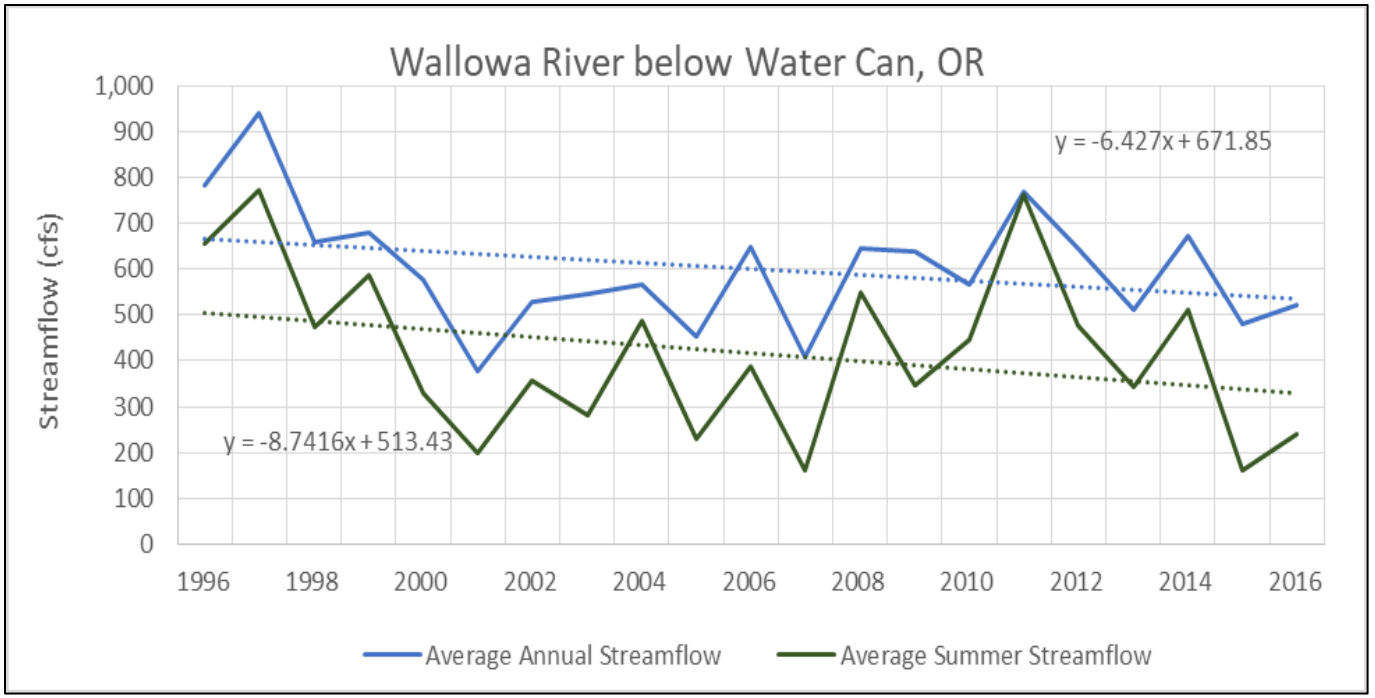

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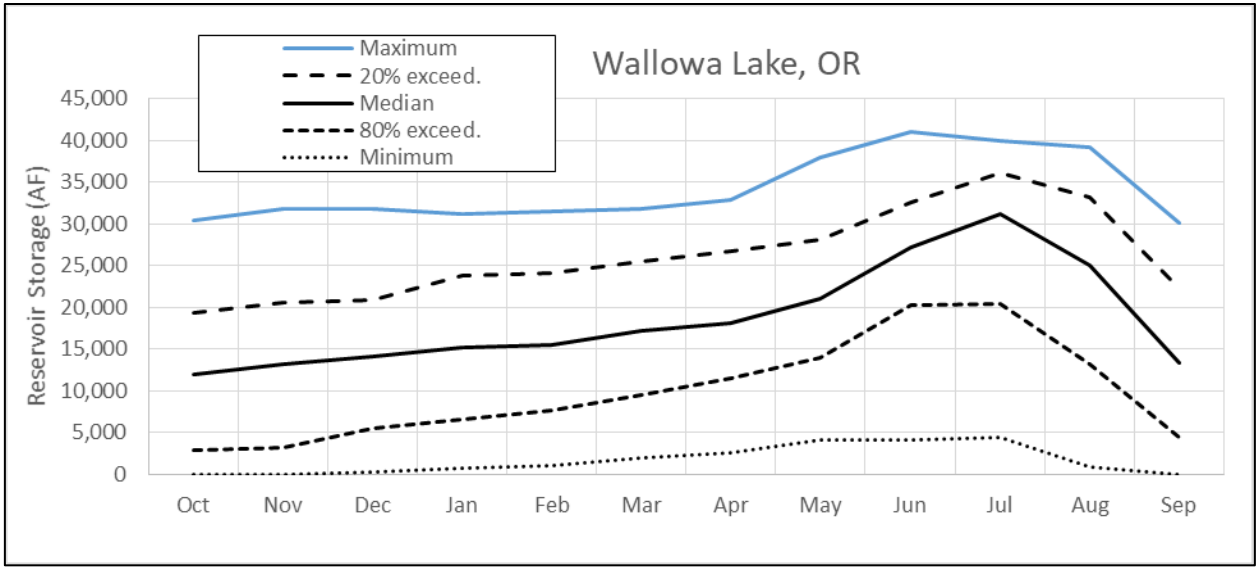
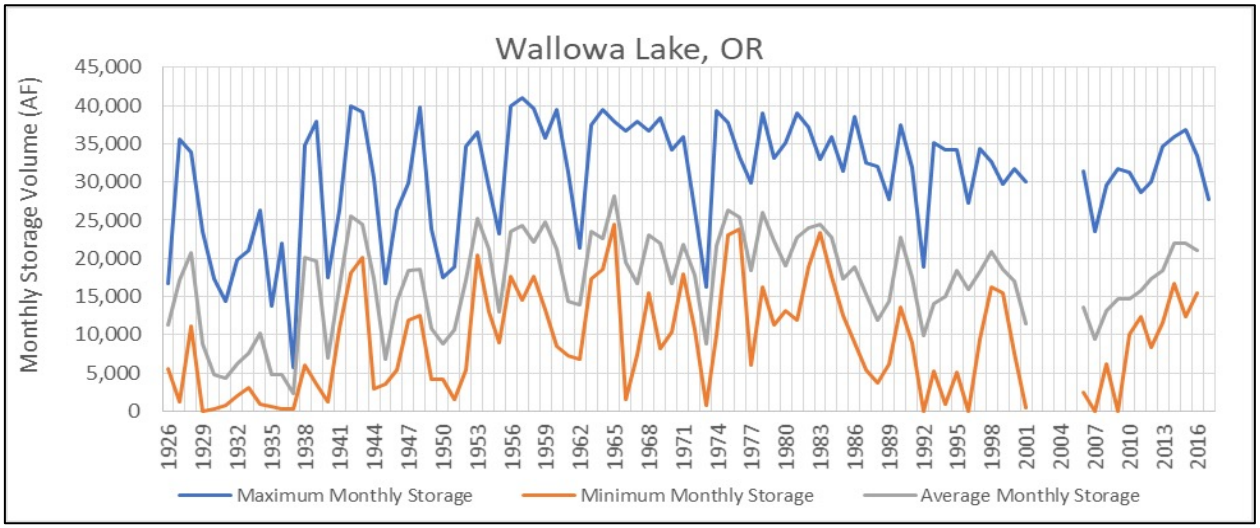
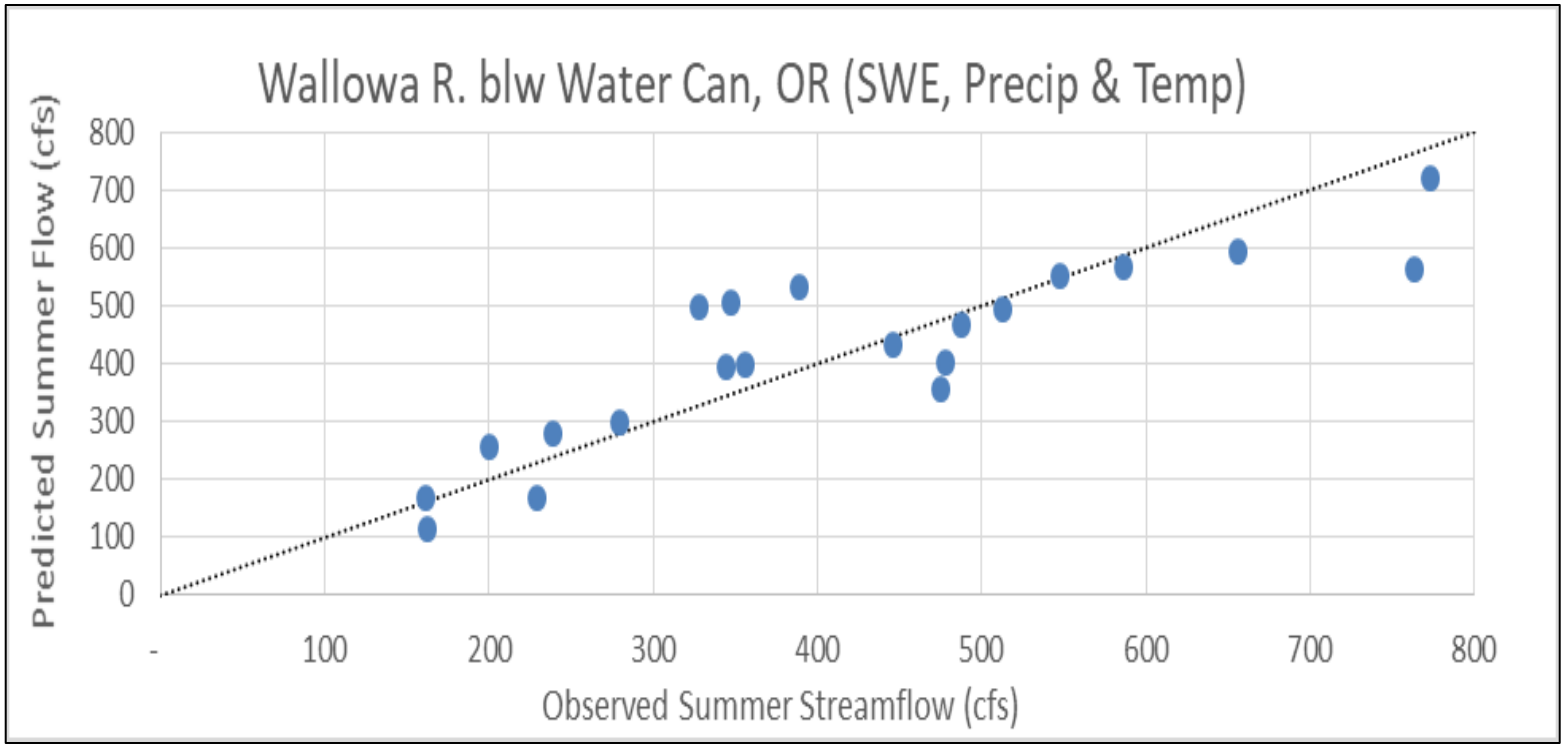




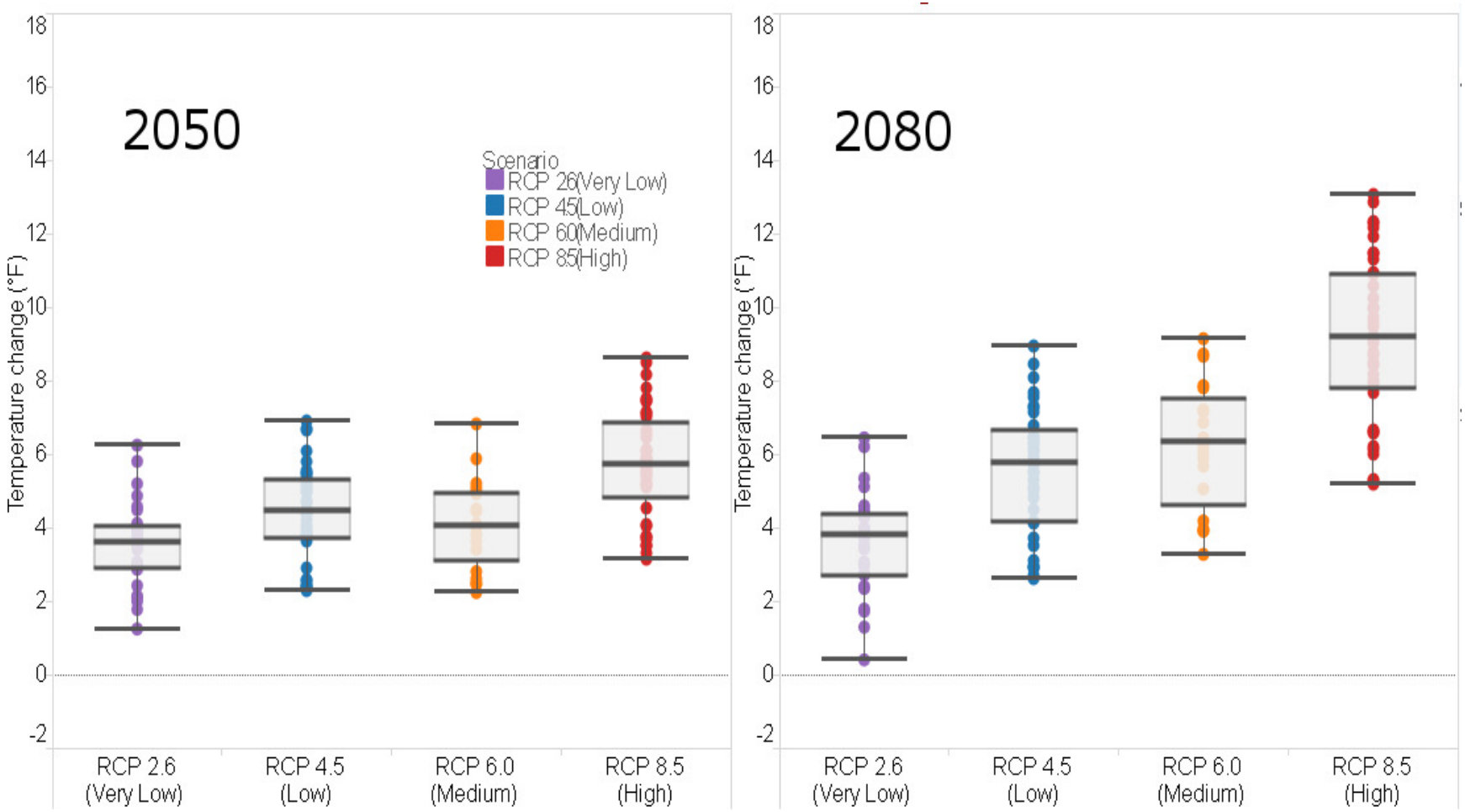
WPN Watershed Professionals Network, LLC

2. Historical Water Supply – Regressions

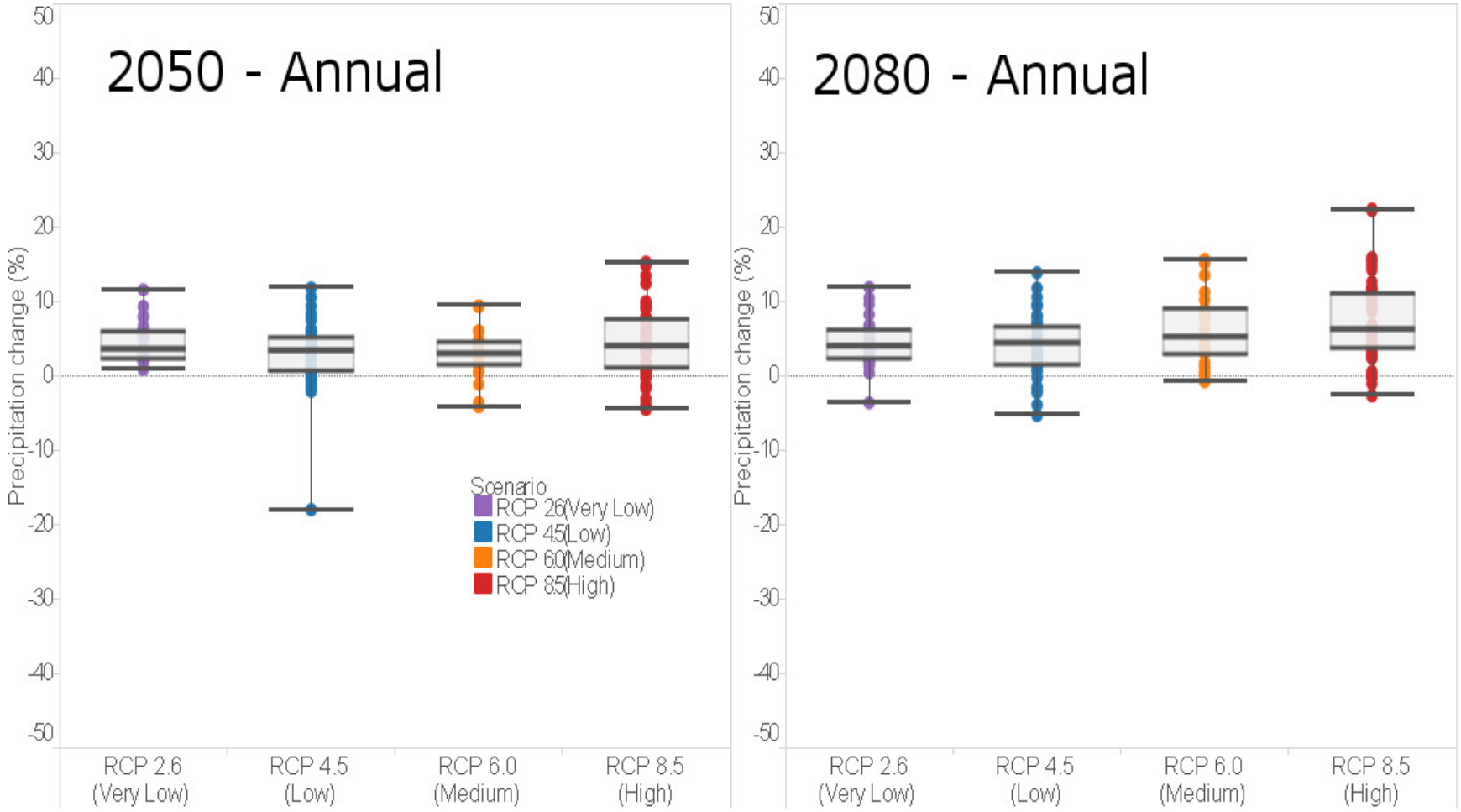


3. Future Water Supply

3. Future Water Supply – Temperature



3. Future Water Supply – Precipitation



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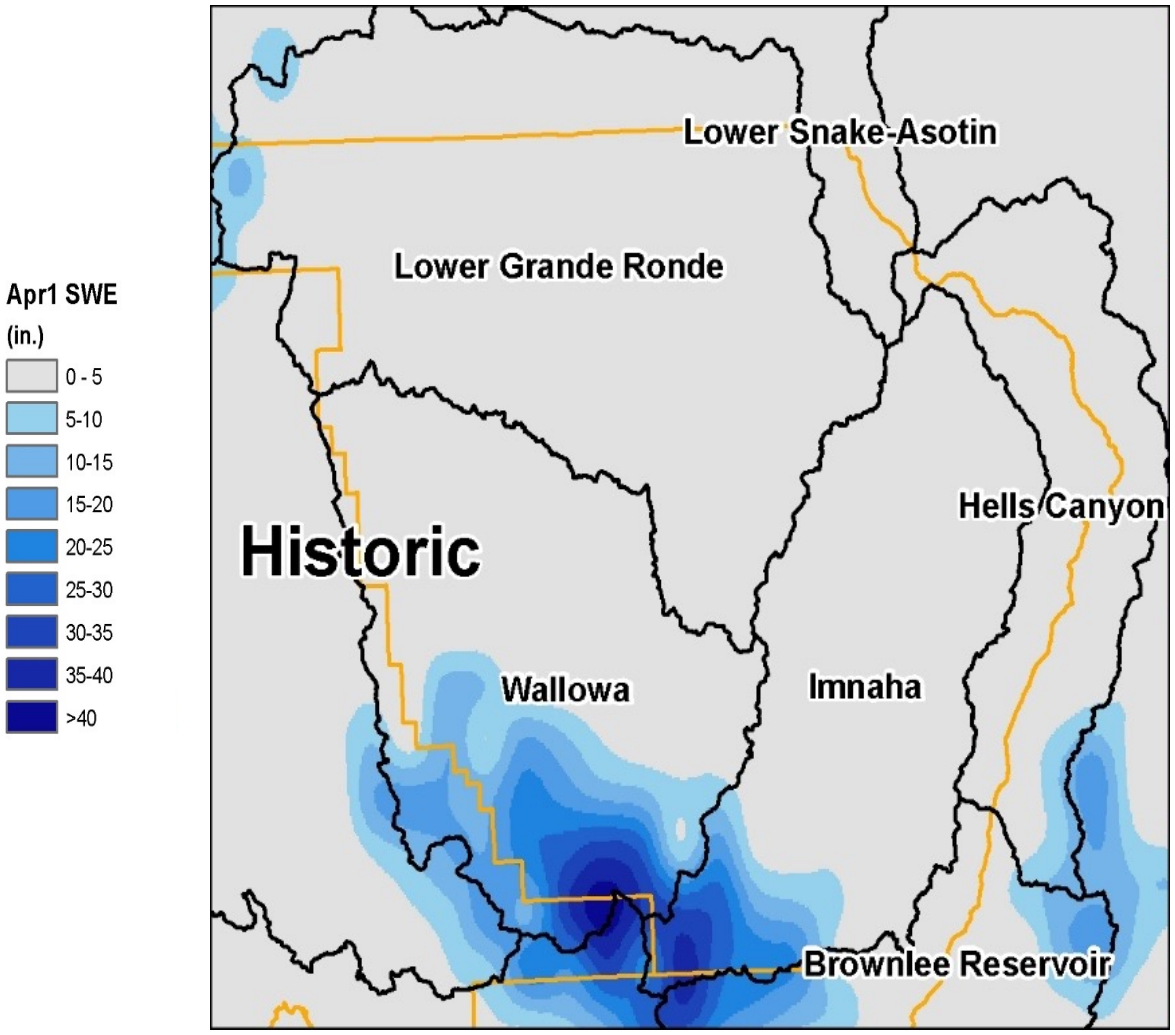

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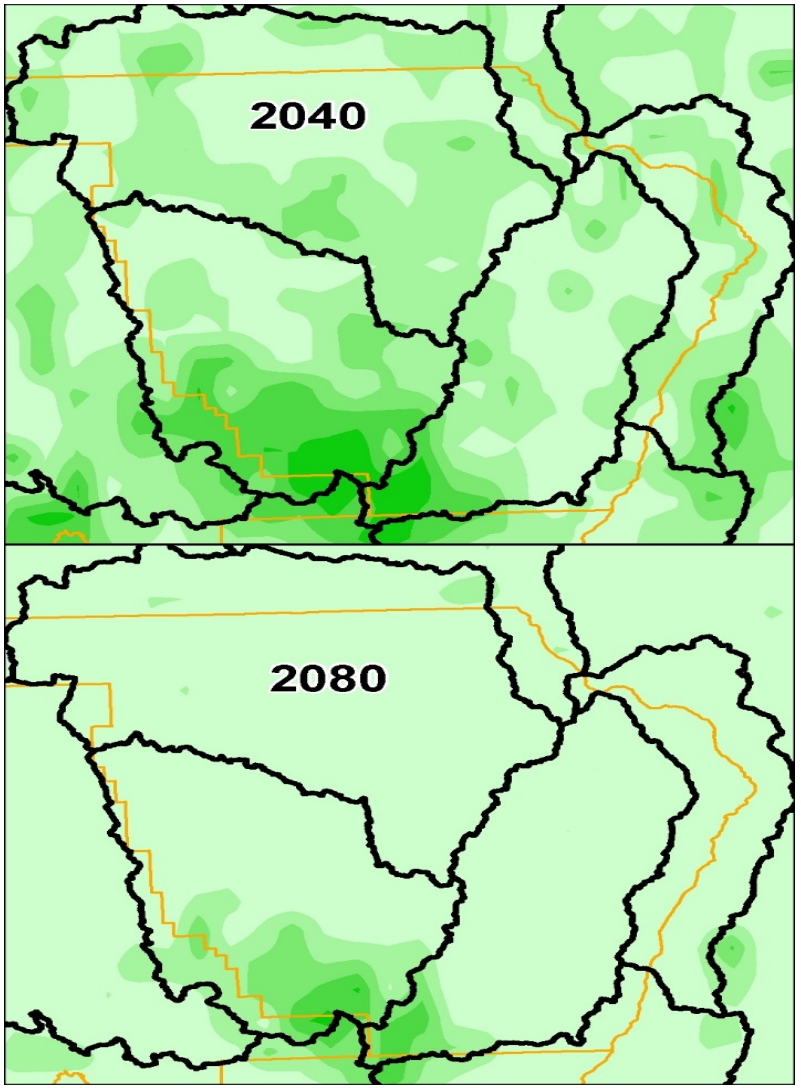

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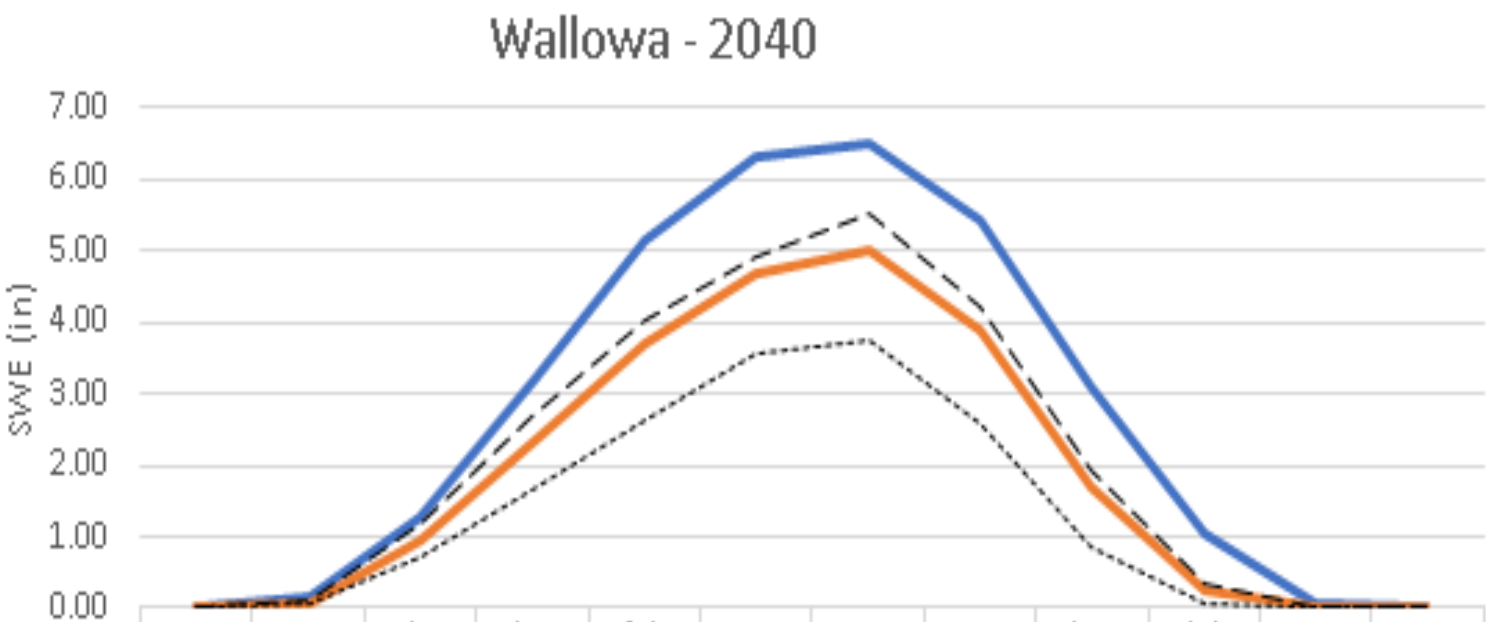
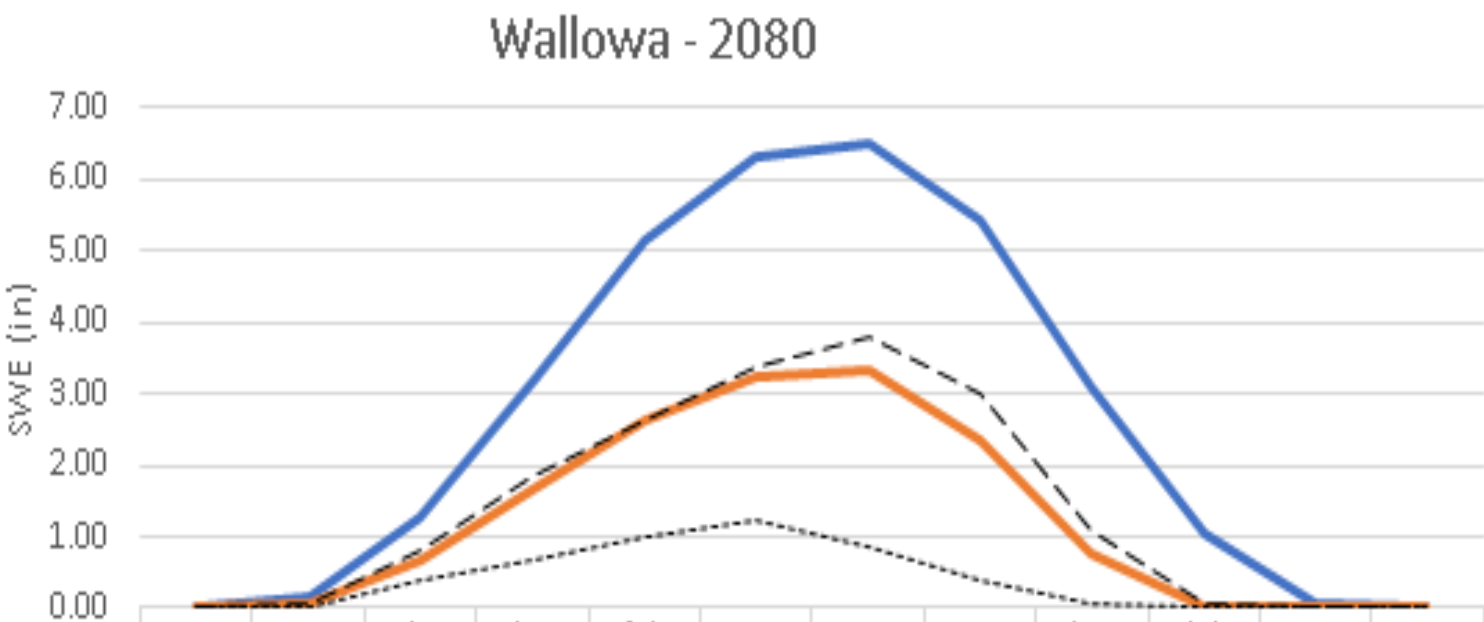


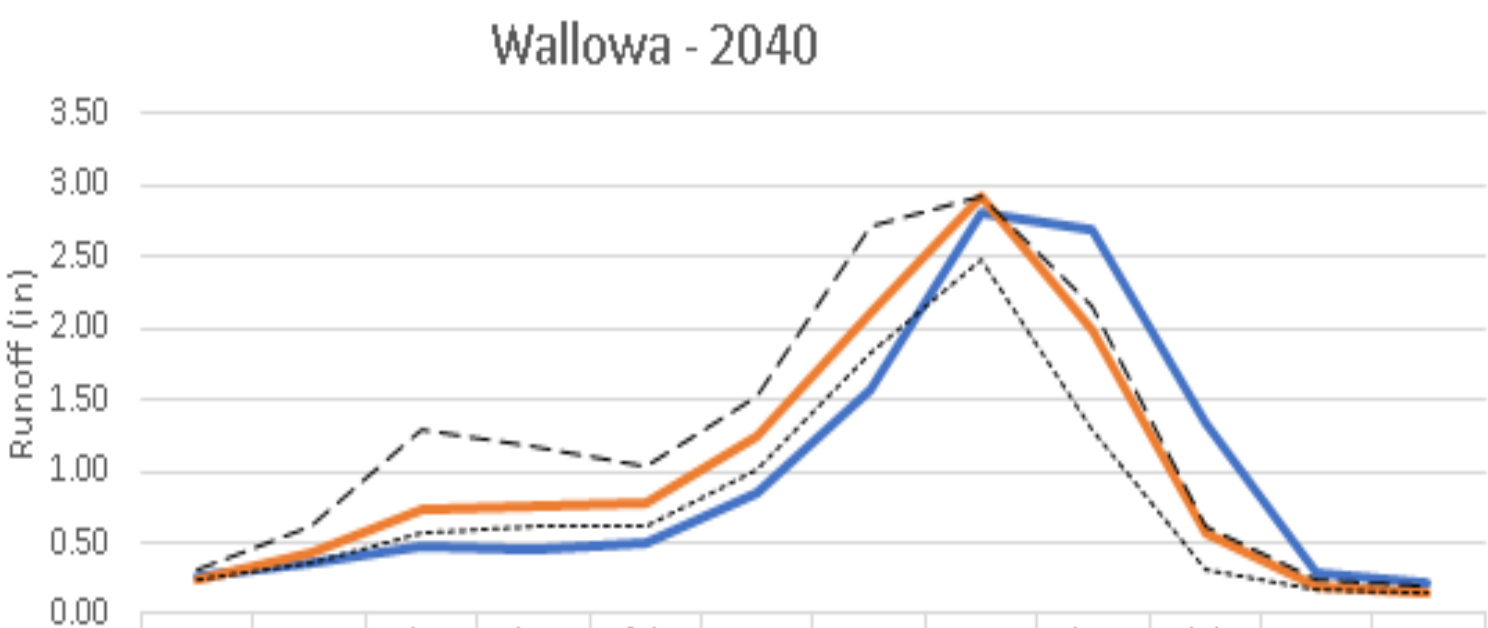
	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep
historical	0.00	0.15	1.30	3.16	5.17	6.33	6.52	5.44	3.12	1.03	0.05	0.00
composite	0.00	0.08	0.97	2.30	3.73	4.69	5.02	3.87	1.70	0.27	0.00	0.00
minimum	0.00	0.07	0.74	1.65	2.61	3.55	3.78	2.58	0.88	0.06	0.00	0.00
maximum	0.00	0.10	1.20	2.67	4.02	4.92	5.52	4.24	1.95	0.33	0.01	0.00

3. Future Water Supply – SWE



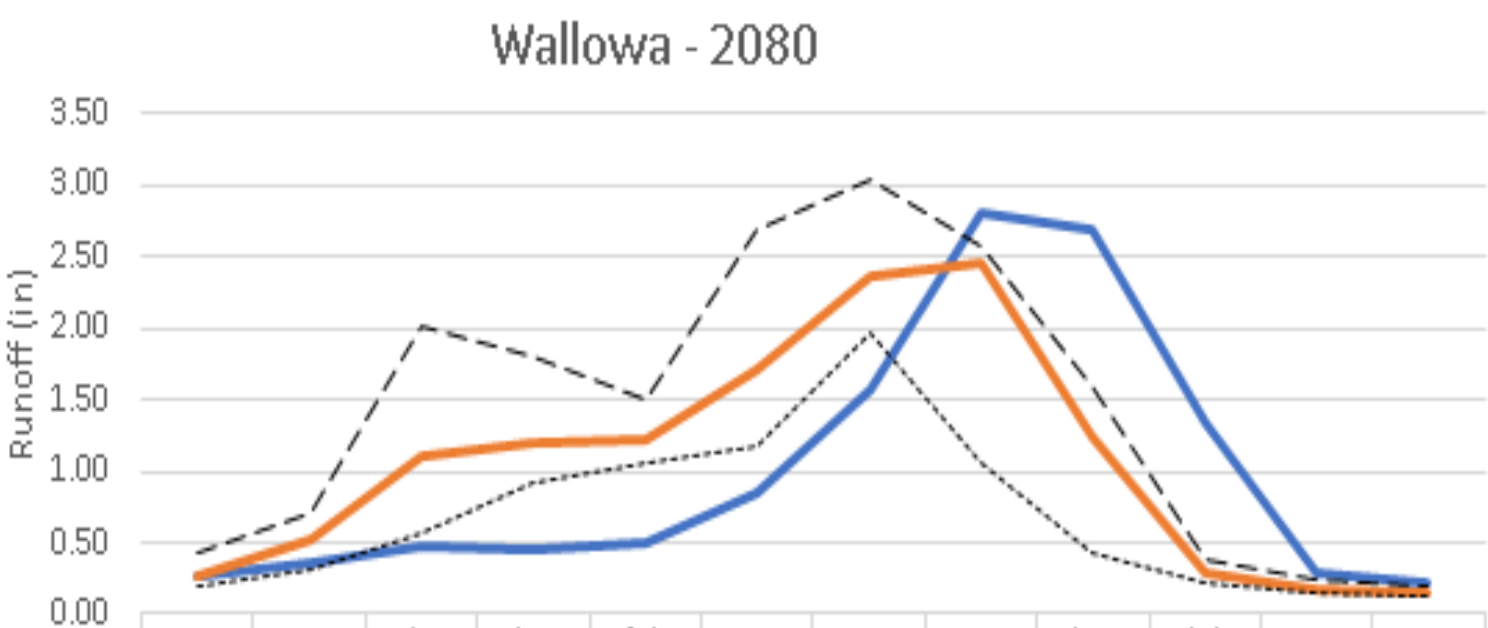
	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep
historical	0.00	0.15	1.30	3.16	5.17	6.33	6.52	5.44	3.12	1.03	0.05	0.00
composite	0.00	0.05	0.67	1.66	2.62	3.22	3.31	2.34	0.75	0.04	0.00	0.00
minimum	0.00	0.04	0.42	0.69	1.02	1.24	0.86	0.41	0.07	0.00	0.00	0.00
maximum	0.00	0.08	0.80	1.84	2.62	3.36	3.78	2.98	1.10	0.08	0.00	0.00

3. Future Water Supply – Streamflow



	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep
historical	0.27	0.35	0.48	0.45	0.50	0.84	1.58	2.81	2.70	1.33	0.29	0.21
composite	0.25	0.43	0.74	0.76	0.78	1.25	2.12	2.93	2.01	0.56	0.19	0.16
minimum	0.25	0.36	0.58	0.61	0.62	1.01	1.84	2.47	1.29	0.32	0.17	0.14
maximum	0.31	0.62	1.30	1.18	1.03	1.53	2.72	2.93	2.15	0.62	0.25	0.19

3. Future Water Supply – Streamflow



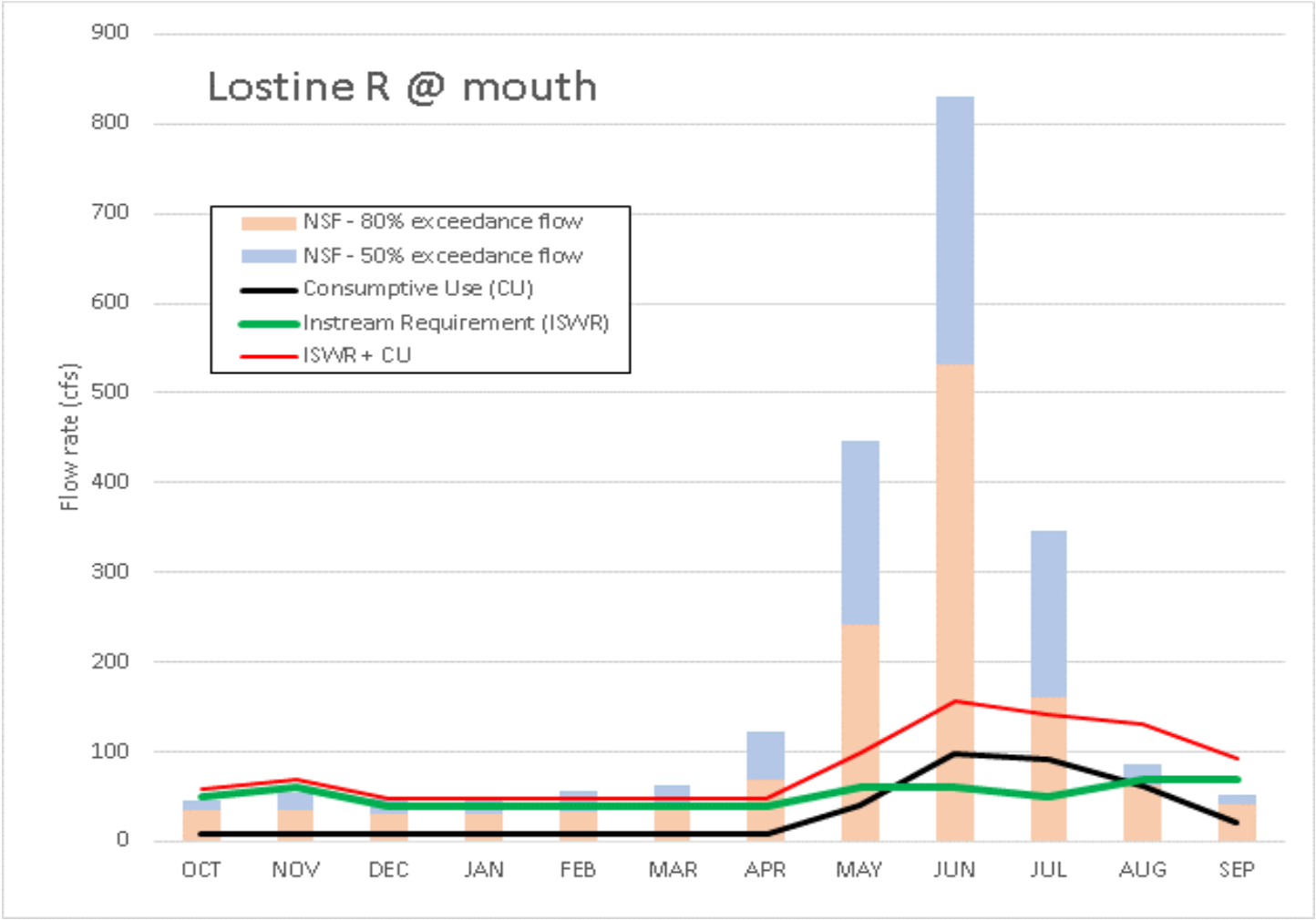
	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep
historical	0.27	0.35	0.48	0.45	0.50	0.84	1.58	2.81	2.70	1.33	0.29	0.21
composite	0.26	0.53	1.11	1.20	1.23	1.73	2.36	2.46	1.24	0.30	0.17	0.15
minimum	0.20	0.31	0.57	0.93	1.05	1.19	1.98	1.06	0.43	0.23	0.15	0.13
maximum	0.43	0.72	2.01	1.82	1.50	2.70	3.05	2.59	1.59	0.38	0.24	0.19

3. Future Water Supply – Streamflow

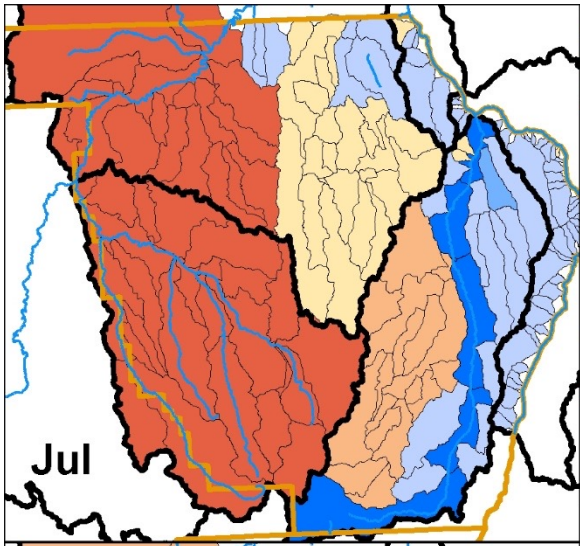
Months	Wallowa		Imnaha	
	2040	2080	2040	2080
Oct - Dec	28%	73%	30%	74%
Jan - Mar	56%	133%	53%	108%
Apr - Jun	0%	-15%	-5%	-20%
Jul - Sep	-50%	-67%	-42%	-55%

4. Water Availability

4. Water Availability



4. Water Availability



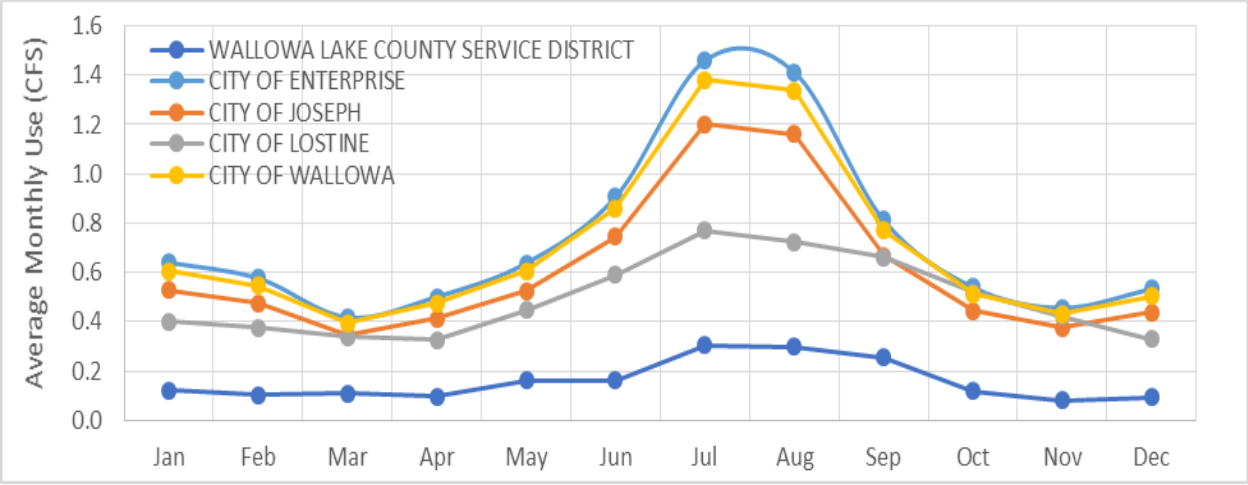
Wallowa:
Water availability is the most limited within the Wallowa sub-basin. No water is available at the 50% exceedance level in any WABs during the months of April, July – September, or November.

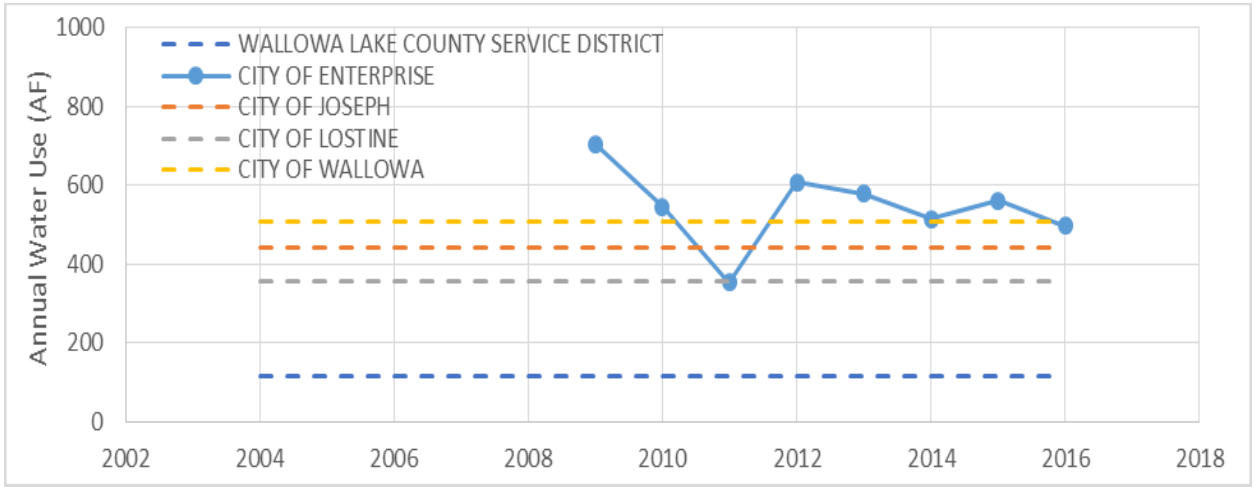
Lower Grande Ronde:
Water is available at the 50% exceedance level in all WABs of the Lower Grande Ronde during the months of March through June and October, and in some WABs for the remaining months.

Imnaha:
Water is available at the 50% exceedance level in all WABs of the Imnaha sub-basin during the months of November through June, and in some WABs for the remaining months.

5. Water Use and Water Rights

5. Water Use and Water Rights - Muni





5. Water Use and Water Rights - Domestic

Sub-Basin	Number of Domestic Rights
Lower Grande Ronde	22
Upper Grande Ronde	182
Wallowa	681
Lower Snake-Asotin	3
Imnaha	52
Hells Canyon	6
Total	**946**

5. Water Use and Water Rights - Commercial

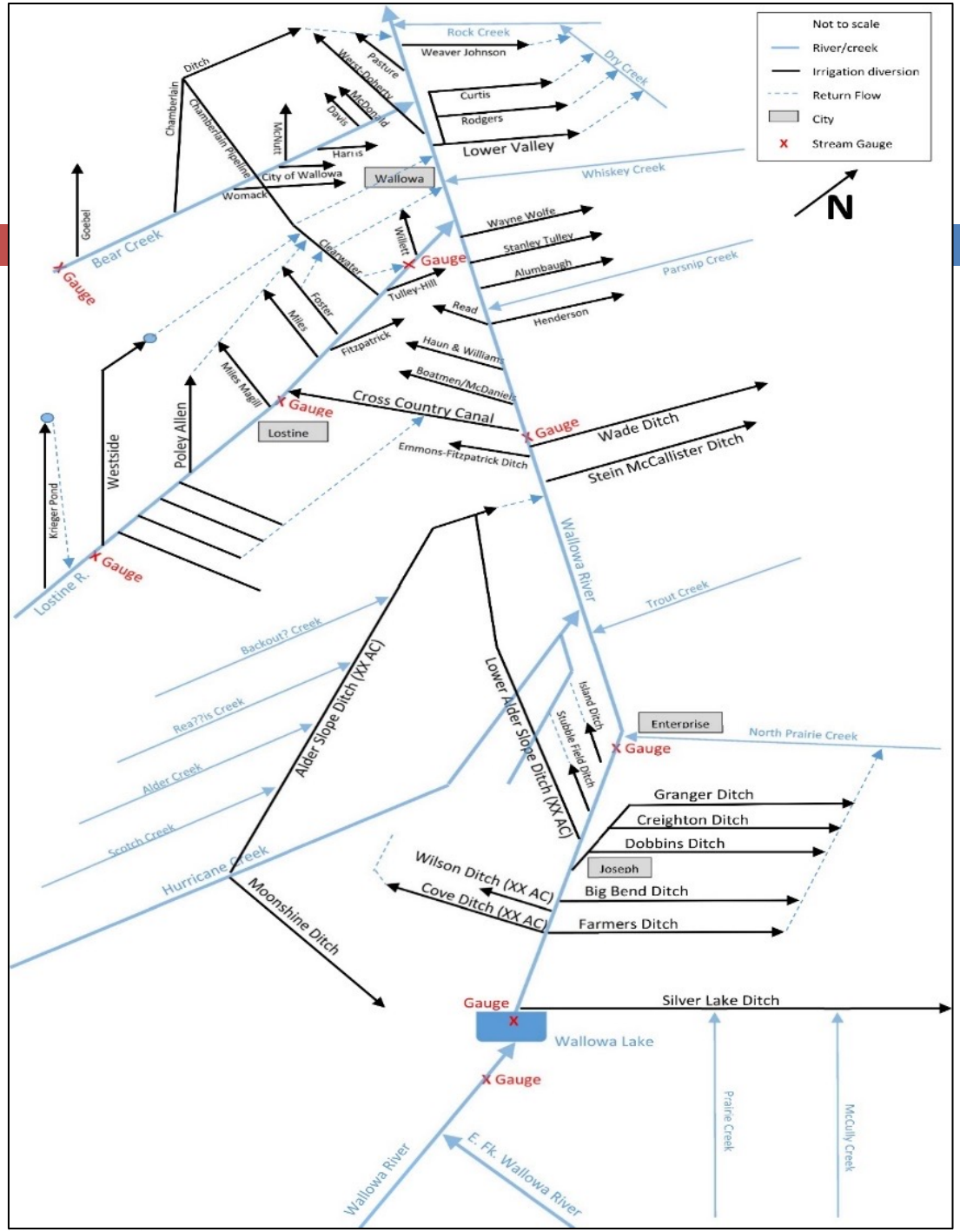
Sub-Basin	Source	POD Rate (cfs)
BOISE CASCADE CORP.	A WELL	0.9
	WALLOWA RIVER	1.36
CHIEF JOSEPH LUMBER CO.	ROUDOLPH SPR	1.02
COUNTY OF WALLOWA	A WELL	2.68
COUNTY OF WALLOWA; HEALTH CARE DISTRICT	A WELL	0.25
COUNTY OF WALLOWA; PUBLIC WORKS	A WELL	0.37
EAST OREGON LUMBER CO.	LITTLE HURRICANE CREEK	24
JOSEPH TIMBER CO. LLC	A WELL	0.007
MILLER MILL & MANUFACTURING CO.	WALLOWA RIVER	2
OREGON PARKS AND RECREATION DEPARTMENT; WALLOWA LAKE MGMT UNIT	A WELL	1.78
Total		**34.7**

5. Water Use and Water Rights - Irrigation

Sub-Basin	Acres
Upper Grande Ronde	100,067
Wallowa	61,158
Imnaha	10,303
Lower Grande Ronde	2,208
Hells Canyon	200
Lower Snake-Asotin	64
Total	**174,001**

5. Water Use and Water Rights - Irrigation

Entity	Acres	Primary Source
Smaller users (company names not listed)	25,359	Multiple
BIG BEND DITCH CO.	6,395	WALLOWA RIVER
FARMERS WATER DITCH CO.	4,782	WALLOWA RIVER
ALDER SLOPE DITCH CO.	4,726	HURRICANE CREEK
SILVER LAKE WATER DITCH CO.	4,012	WALLOWA RIVER
WRENN AND DOBBIN DITCH CO.	3,196	WALLOWA RIVER and RES.
DOBBIN DITCH CO.	2,024	WALLOWA RIVER
CHAMBERLAIN DITCH CO.	1,341	BEAR CREEK
HURRICANE CREEK IRRIGATING DITCH CO.	1,283	HURRICANE CREEK
WEST SIDE IRRIGATION AND WATER DITCH CO.	1,200	LOSTINE RIVER
GRANGER WATER DITCH CO.	1,068	WALLOWA RIVER
CLEARWATER DITCH CO.	995	LOSTINE RIVER
LOWER VALLEY IMPROVEMENT DISTRICT	735	WALLOWA RIVER
MOONSHINE DITCH CO.	705	HURRICANE CREEK
SHEEP RIDGE DITCH CO.	445	LOSTINE RIVER
COVE DITCH CO.	391	WALLOWA RIVER
ISLAND IRRIGATING WATER DITCH CO.	327	WALLOWA RIVER
CIRCLE M CATTLE CO.	280	WELL
SILVER CREEK DITCH CO.	246	SILVER CREEK
PINE TREE PIPELINE ASSOCIATION	242	HURRICANE CREEK
ALLEN CANYON SPRINKLER ASSOCIATION	225	LITTLE BEAR CREEK

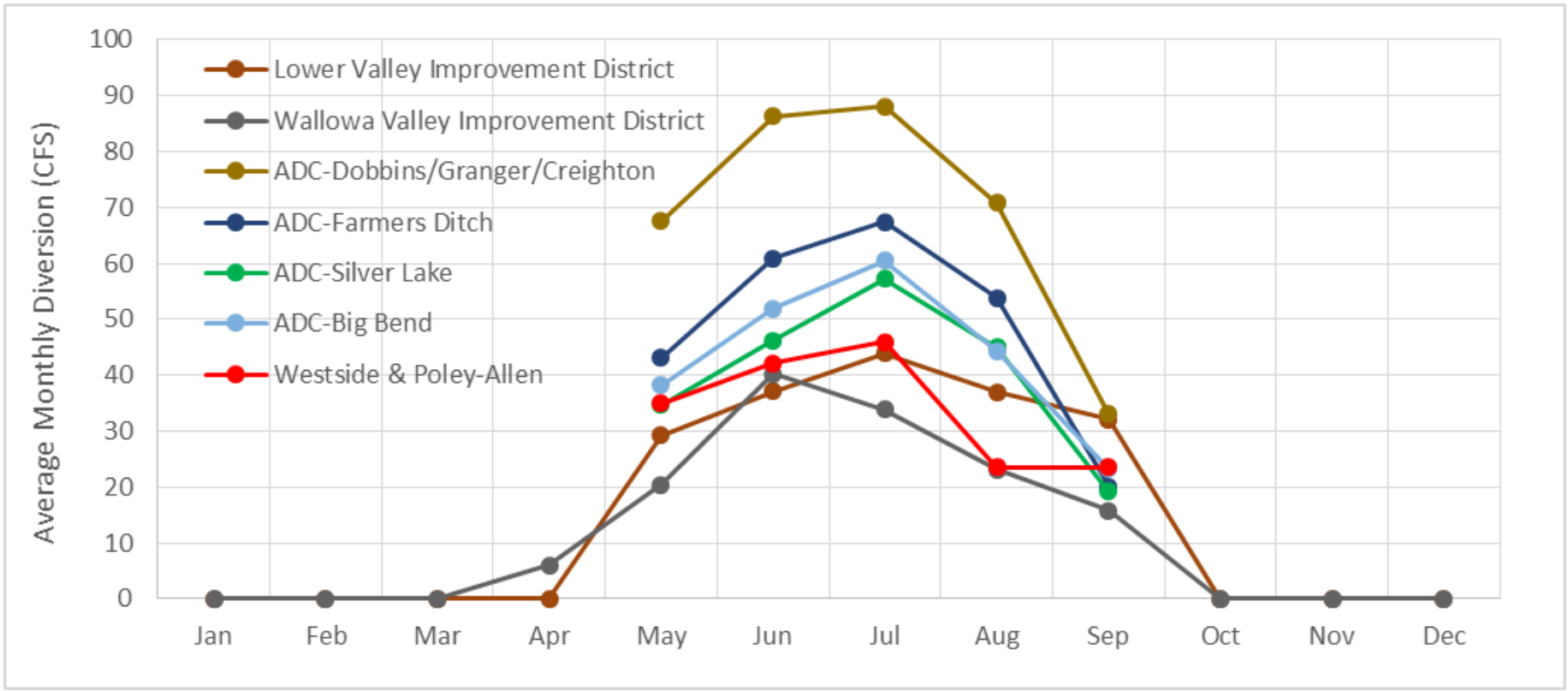


5. Irrigation

Edits:

1. Backout? Creek
2. Move Big Bend Ditch location
3. Label ditches upstream of Lostine
4. Willet and McNutt ‘not in use’
5. Add Imnaha and WLID
6. Other?

5. Water Use and Water Rights - Irrigation

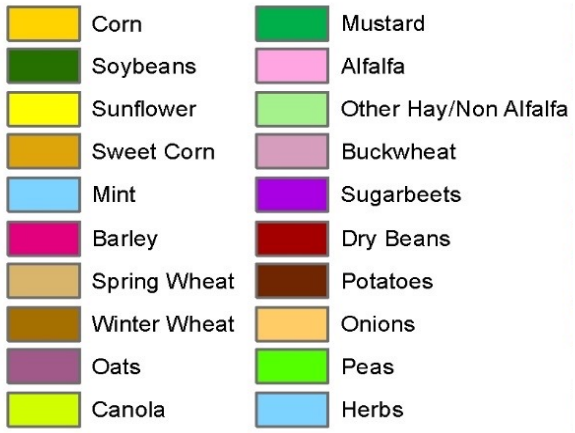


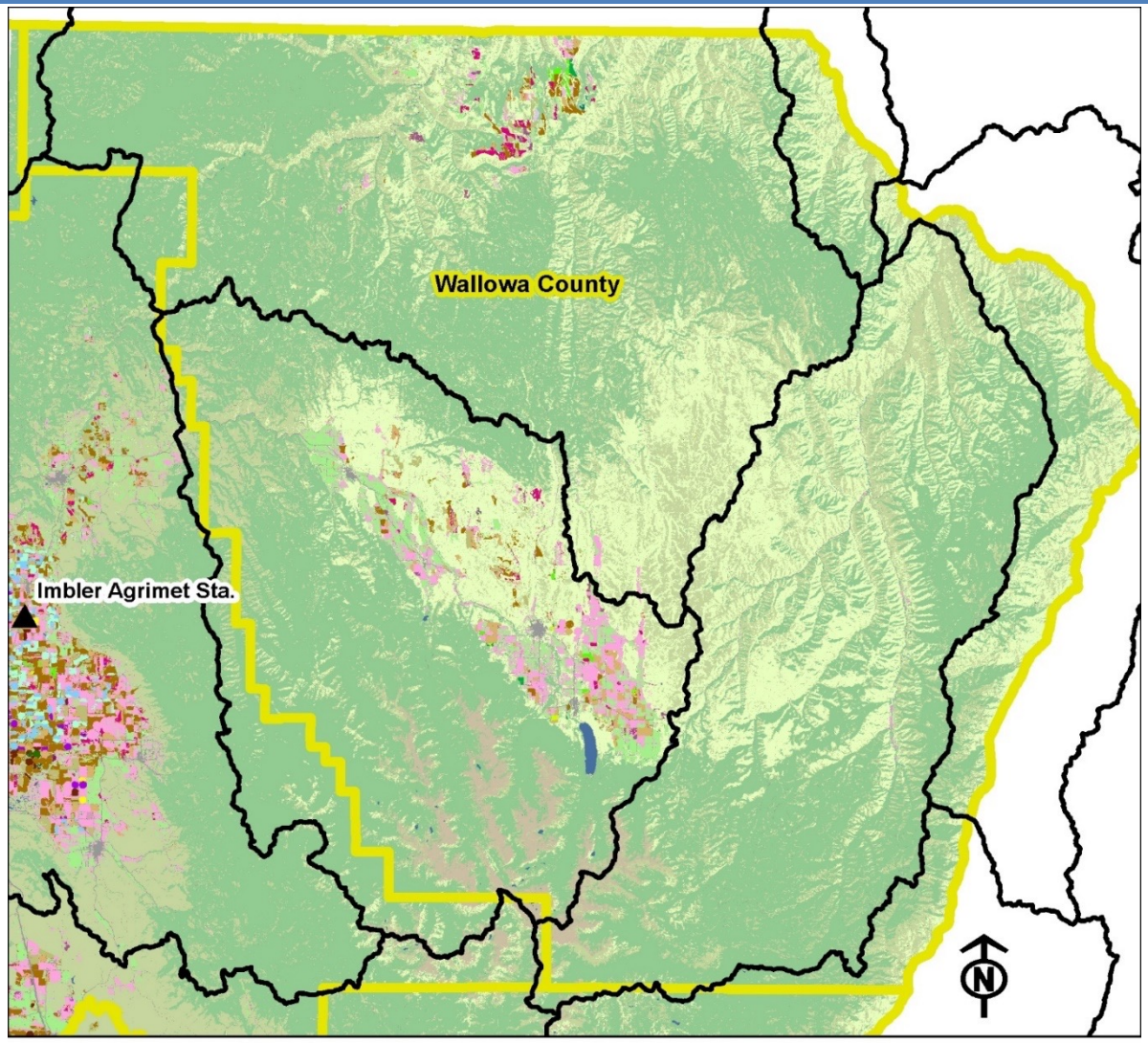
5. Water Use and Water Rights - Irrigation

Entity		Total
Lower Valley Improvement District[1]	Total AF	10,797 AF
	Per acre	-
Wallowa Valley Improvement District[2]	Total AF	8,034 AF
	Per acre	1.23 feet
Associated Ditch Companies[3]	Total AF	65,045 AF
	Per acre	2.99 feet
Westside & Poley-Allen[4]	Total AF	8,505 AF
	Per acre	3.15 feet
Estimate of all irrigation water rights in Wallowa	61,158 acre	183,125 AF[6]

Notes:
[1] Need acres (OWRD lists 720)
[2] Based on 6,508 acres per OWRD database.
[3] Based on 21,723 acres per OWRD database for Big Bend (6,395), Farmers (4,782), Silver Lake (4,012+246), Wrenn and Dobbin (3,196), Dobbin (2,024), and Granger (1,068).
[4] Based on 2,700 acres per OWRD database and Nez Perce report.
[5] Based on 61,158 acres per OWRD database for all primary irrigation water rights in Wallowa 8th field HUC.
[6] Uses monthly crop demand calculated for the Associated Ditch Companies.

5. Water Use and Water Rights - Irrigation





5. Water Use and Water Rights - Irrigation

Crop	Agrimet crop used	Group	Wallowa (acres)
Alfalfa	Alfalfa (mean)	irrigated	21,543
Barley	Rapeseed	irrigated	1,105
Canola	Rapeseed	irrigated	183
Fallow/Idle Cropland	Pasture	irrigated	1,644
Mustard	Peppermint	irrigated	246
Oats	Rapeseed	irrigated	902
Other Hay/Non Alfalfa	Bluegrass	irrigated	22,966
Peas	Peas	irrigated	484
Spring Wheat	Spring grain	irrigated	6,233
Triticale	Spring grain	irrigated	155
Winter Wheat	Winter grain	irrigated	2,630

5. Water Use and Water Rights - Irrigation

Table 30. Crop water use (inches) estimated at the IMBO Agrimet station.

Crop	Min	Mean	Max
Alfalfa (mean)	30	33.4	38.6
Apples	26.2	30.1	33.1
Bluegrass	12.7	14.7	16.9
Cherries	25.9	31.6	35.2
Dry beans	15.3	18.1	20.9
Field corn	19.2	23.6	26.9
Garlic	22.2	25.5	28.5
Lawn	29	32.5	36.8
Pasture	24	26.7	30.4

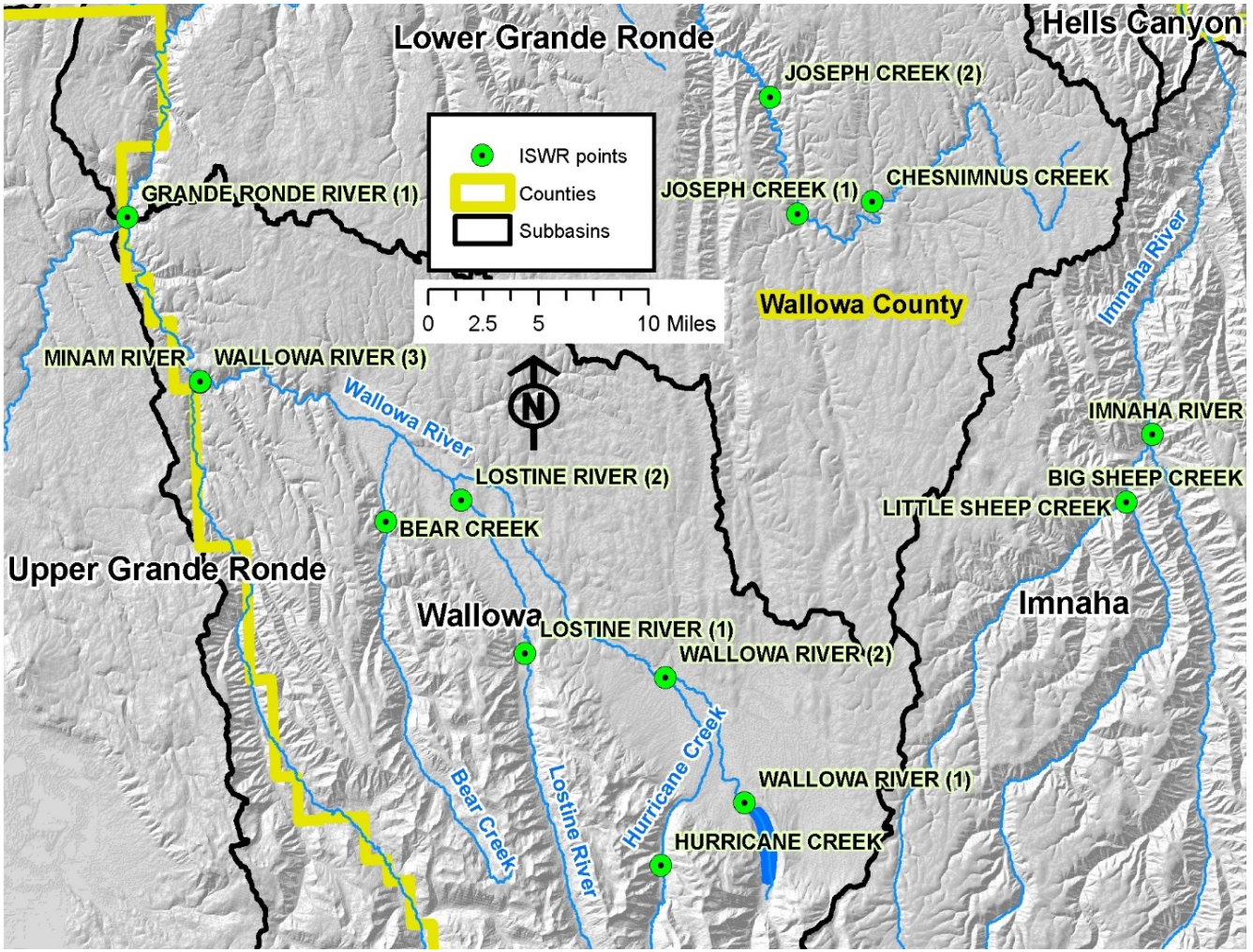
Crop	Min	Mean	Max
Peas	11.4	12.8	14.6
Peppermint	19.7	23.4	26.1
Potatoes	19	22.5	27.7
Rapeseed	17.1	20.9	23.3
Spring grain	17.5	21.1	26
Sugar beets	21.5	26.6	31.4
Sweet corn	18.3	20.8	27.9
Winter grain	17.5	20.5	23.1
3rd Year + Poplar	30	34.4	38.8

To what degree does in-season precipitation go to meet crop ET demand?

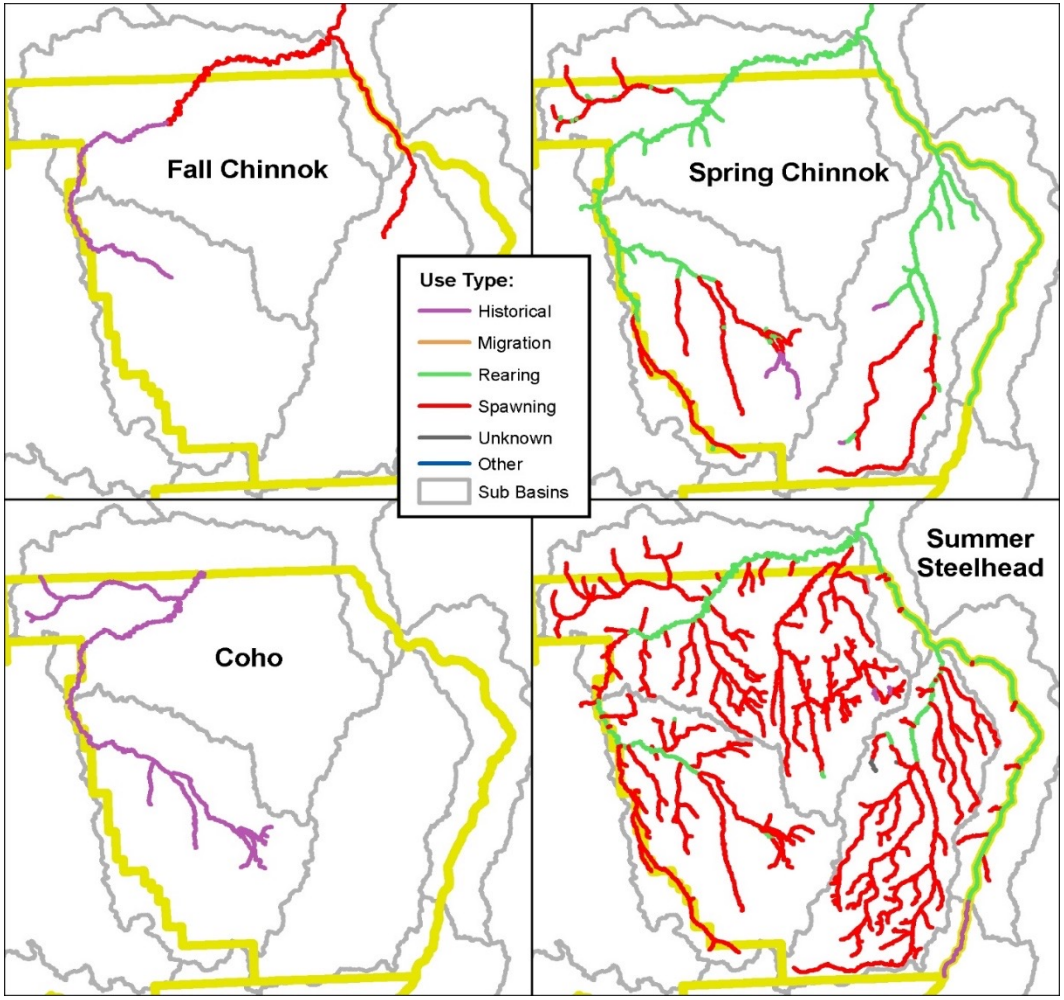
5. Water Use and Water Rights - Irrigation

Crops Water Use in Wallowa Valley	Acre-Feet per year
Alfalfa	59,961
Other Hay/Non-Alfalfa	28,133
Spring Wheat	10,960
Winter Wheat	4,493
Fallow/Idle Cropland	3,658
Barley	1,925
Oats	1,571
Peas	516
Mustard	480
Canola	319
Triticale	273
Other crops	103
Total	**112,391**

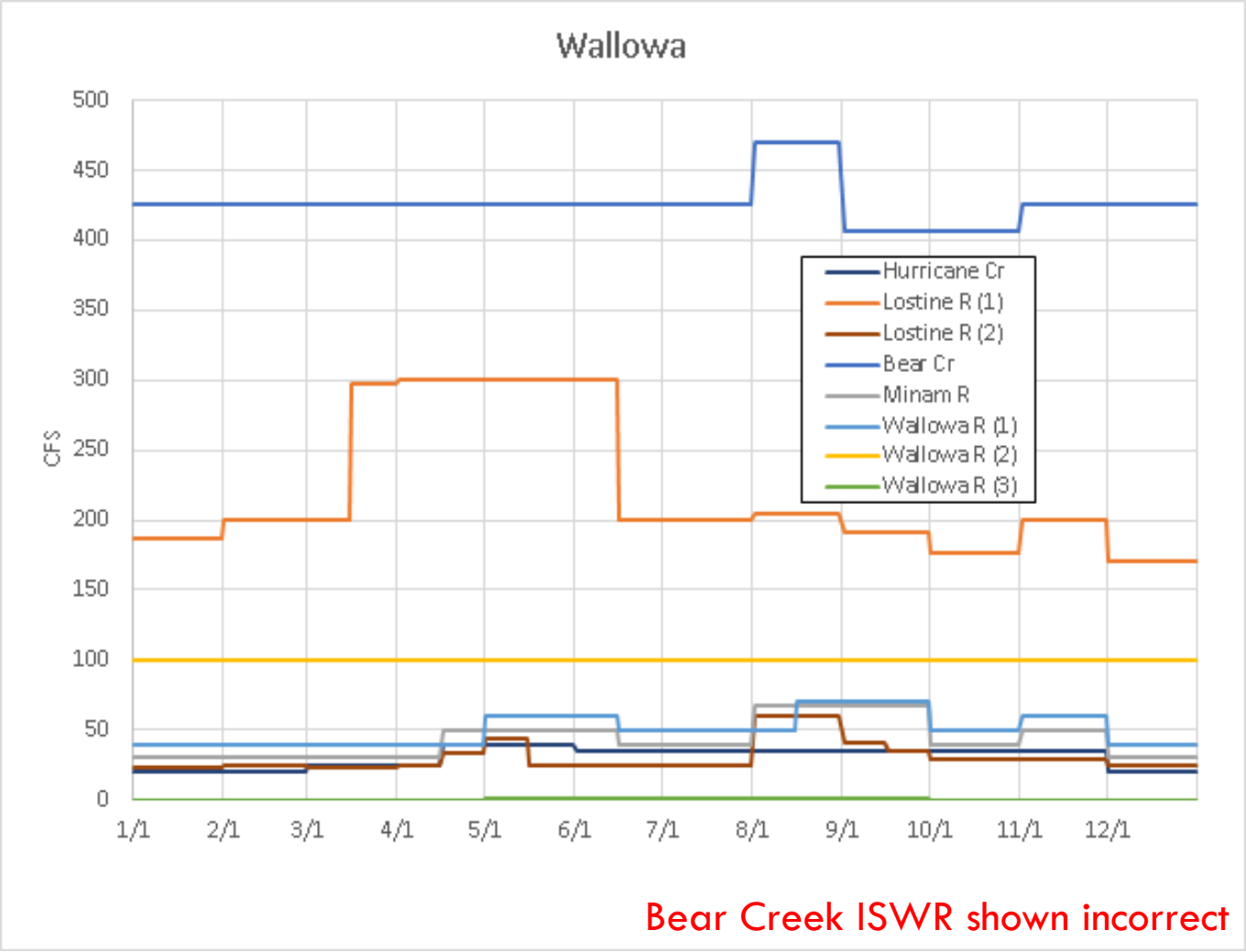
5. Water Use and Water Rights - Instream



5. Water Use and Water Rights - Instream

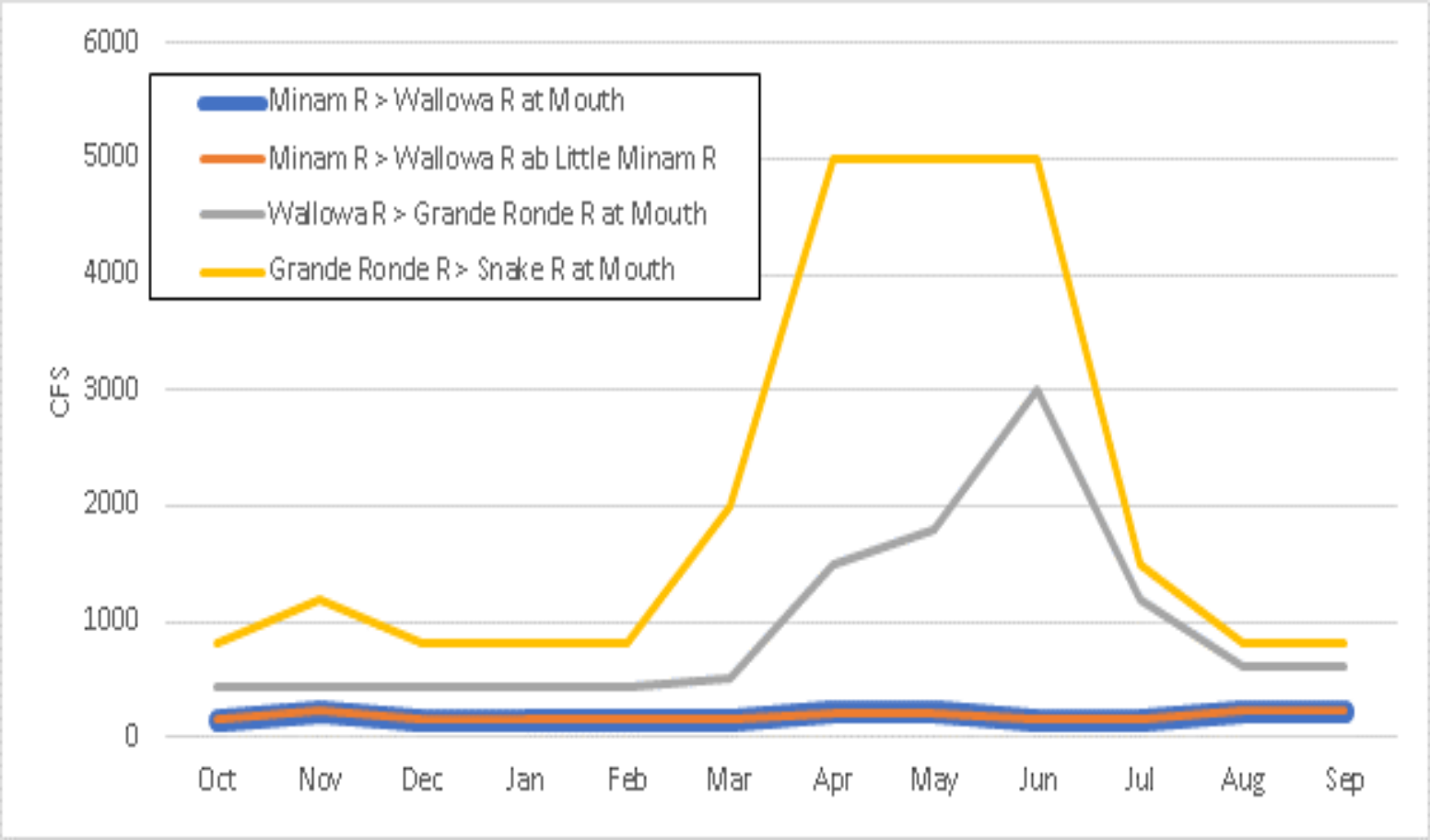


5. Water Use and Water Rights - Instream



Bear Creek ISWR shown incorrect

5. Water Use and Water Rights – Scenic Water Ways



5. Water Use and Water Rights – Priority Fish Flows

Wallowa	Target Flow of 70 CFS
Lostine	Target Flow of 25 CFS
Bear Creek	Target Flow of 8 CFS
Hurricane Creek	Target Flow of 15 CFS
Upper Imnaha tribs	Target Flow of 12 CFS
Upper Big/Little Sheep	Target Flow of 10 CFS

6. Key Findings

1. Although county-average water year precipitation has a high degree of variability, the 10-year moving average has remained between 15-20 inches per year from 1895-present.

2. Climate variability (e.g., El Nino/La Nino, Pacifica Decadal Oscillation) has caused decade-long cool/wet and warm/dry periods, and should be considered when interpreting climate trends.

3. The basin has been experiencing a warming trend from 1950-present, with most warming occurring during the summer months (10-year moving average August temperatures shows an approximately 4° F warming from 1955-present).

6. Key Findings

4. Runoff is snowmelt dominated, with a majority of precipitation in high elevation areas falling as snow and contributing to spring/summer runoff with rapid recession.

5. Annual and summer runoff volumes show a decreasing trend (for all sub-basins except the Imnaha), but the trends are likely driven by the current dry Pacific Decadal Oscillation phase and not actual long-term trend.

6. Instream water rights:
   - Wallowa River at Enterprise met all the time.
   - Wallowa River at Water Can are met except approximately 20 % of the time in August and September.
   - Minam, Bear Creek, and Lostine are typically not met 50 % of the time in the winter, met April through July, and not met in August and September.
   - Grande Ronde at Troy are met in all but a handful of days

6. Key Findings

7. Summer streamflow is correlated with winter precipitation and snowpack, and can be predicted with some accuracy based on regression analysis. However, available climate-runoff modeling results from the CIG are probably the most useful predictor of future streamflow currently available.

8. *Limited data exists on inflow to Wallowa*, however it appears that typically only 15,000 (acre-feet) AF of active storage is used compared to an average annual inflow 82,000AF/yr.

9. Climate change is expected to increase basin-average air temperatures by 3 to 5° F by 2050, and 4 to10° F by 2080. Annual precipitation is expected to increase by 0-5% for the same period, with a 5-10% decrease in summer.

6. Key Findings

10. As a result of climate change, winter precipitation will shift from snow to a greater frequency of rain, resulting in a smaller snowpack. Lower elevation areas are expected to lose over 60% of their historical snowpack, while snowpack in upper elevation areas (roughly above 7,000 feet) will remain relatively unchanged. Averaged over the entire Wallowa sub-basin, the 2040s are expected to have 23% less snow than historical snowpack, while the 2080s are expected to have 49% less.

11. Due to increased temperature associated with climate change, natural Wallowa River July-September runoff is expected to decrease by 50% by the 2040s and 67% by the 2080s.

6. Key Findings

12. Municipal water use ranges from a low of 2 cfs in the winter to a high of 5 cfs in the summer (for a total of approximately 2,000 AF/year).

13. There are 681 domestic water rights in the Wallowa sub-basin. No data is available for water use for domestic rights, however, based on municipal use rates it's estimated that cumulative domestic use is on the order of 250 AF/year.

14. Commercial water rights in Wallowa County have a total water right of 35 cfs, though it's likely actual water use is significantly lower than the water rights.

6. Key Findings

15. 61,158 acres in the Wallowa sub-basin have irrigation water rights, which matches closely with the 2016 USDA estimate of 58,138 irrigated acres.

16. Water diversion data exists for less than 50% of the irrigated area, and no data exists on amount of return flows back to rivers.

17. Based on limited data, it appears the Associated Ditch Company diverts approximately 2.99 AF/acre and the Westside Poly/Allen diverts 3.15 AF/acre.

6. Key Findings

18. Total basin irrigation water diversions are estimated at 183,125 AF/year, compared against average USDA crop demand of 112,391 AF/year*, up to 30k AF of which may be being met by in-season precipitation.* Together these values represent an overall irrigation efficiency of 45%.

19. The difference between the values above includes diversion return flows and water lost during the application process. It should be stressed that both the diversion and crop demand values are based on limited data and should be seen as an initial estimate.

7. Recommendations

1. Conduct a comprehensive assessment of irrigation water use and water conservation potential that would include:
    a. Water diversion data for all irrigated acreage,
    b. On-farm delivery data for all irrigated acreage,
    c. Actual crop water use,
    d. Return flow amounts and locations,
    e. Estimate of conveyance efficiency upgrades (cost and water savings),
    f. Estimate of on-farm efficiency upgrades (cost and water savings),
    g. Develop a basin-wide plan for how conserved water would meet multiple stakeholder needs.

2. Evaluate positive/negative impacts of piping (e.g., instream flows may be reduced in some areas); develop piping strategies and priorities.

7. Recommendations

3. Perform an in-depth analysis of projected impacts of climate change (specifically decreased late-summer streamflow) on irrigation water supply and ability to meet instream needs.

4. Evaluate if the opportunity exists to more actively use Wallowa Lake storage to meet instream and out-of-stream needs. This includes use of existing storage as well as restoring storage that is not currently used due to dam safety concerns.

5. Have discussions amongst stakeholders if the water available in the Imnaha sub-basin can be used to improve instream flows in the Wallowa sub-basin, and if it is desirable to pursue that.

7. Recommendations

6. Consider potential for developing water banking or other tools to ameliorate flow impacts in drought years.

7. Develop a Wallowa Valley Water Management Plan that would:
    a. Analyze instream flows to determine which reaches should be prioritized for flow restoration. Use IFIM or other quantitative fisheries tools if available,
    b. Leverage information generated under Recommendation #1,
    c. Makes recommendations on management of Wallowa Lake storage,
    d. Develop a basin-wide action plan that prioritizes projects and potential funding sources,
    e. Consider potential for developing water banking or other tools to ameliorate flow impacts in drought years.

7. Recommendations

8. Use funding from OWRD and Water-Smart funding from Bureau of Reclamation to implement the above recommendations. OWRD options include:
   - Feasibility Studies: $2.5M available, 50% cost-share, 10/17/2018 deadline
   - Water Projects: $13.8M available, 25% cost-share, 4/25/2018 deadline
   - Place-Based Planning: No available funding

9. Quantitative monitoring of return flows to inform water management decisions and quantify conservation potential.

Schedule

12/31/2017	Draft Report complete
1/19/2018	Stakeholder meeting
1/26/2018	Comments on report back to WPN
1/30/2018	Final Report complete