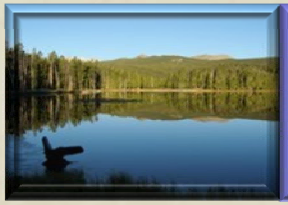
Progress Report
Wind-Bighorn Basin Plan Update

Wind-Bighorn Basin Advisory Group

June 18, 2009



Wyoming Water Development Commission
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SEH

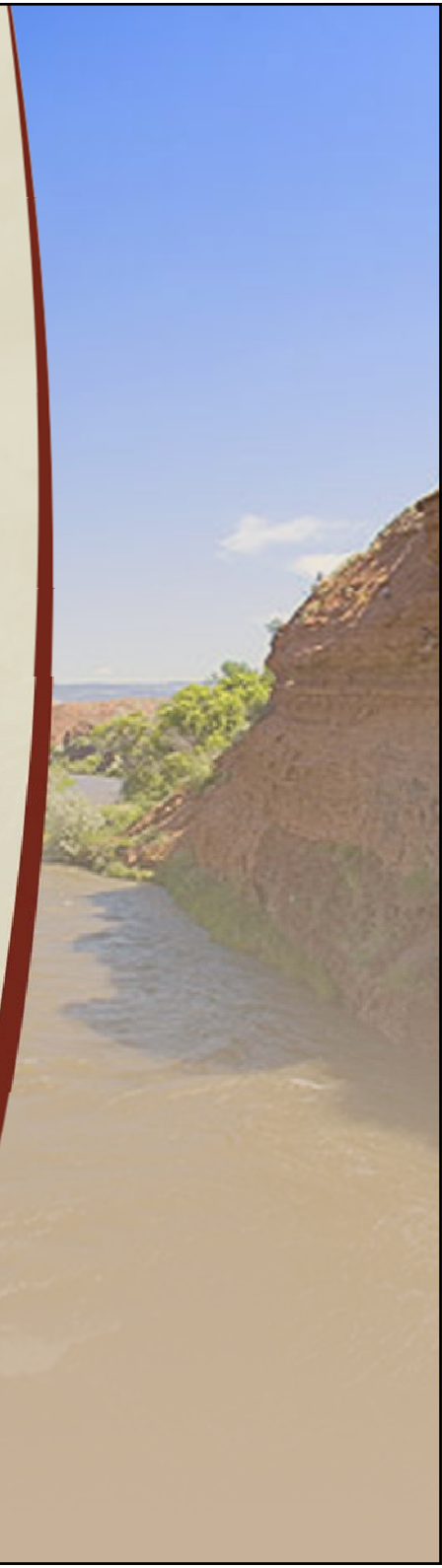
MWH

Presentation Outline

- Review Goals of Basin Plan Update
- General Progress Report
- Surface Water Hydrology
- Next Steps

Goals of Basin Plan Update

- ***Update Planning Tools*** to Include Most Recent 5 Years (Extended Drought)
- ***Develop Strategies*** *to Help Meet the Needs of the Basin as they are Identified by the Planning Process*
- ***Promote and Enhance Stakeholder Dialog*** Through Basin Advisory Group Meetings

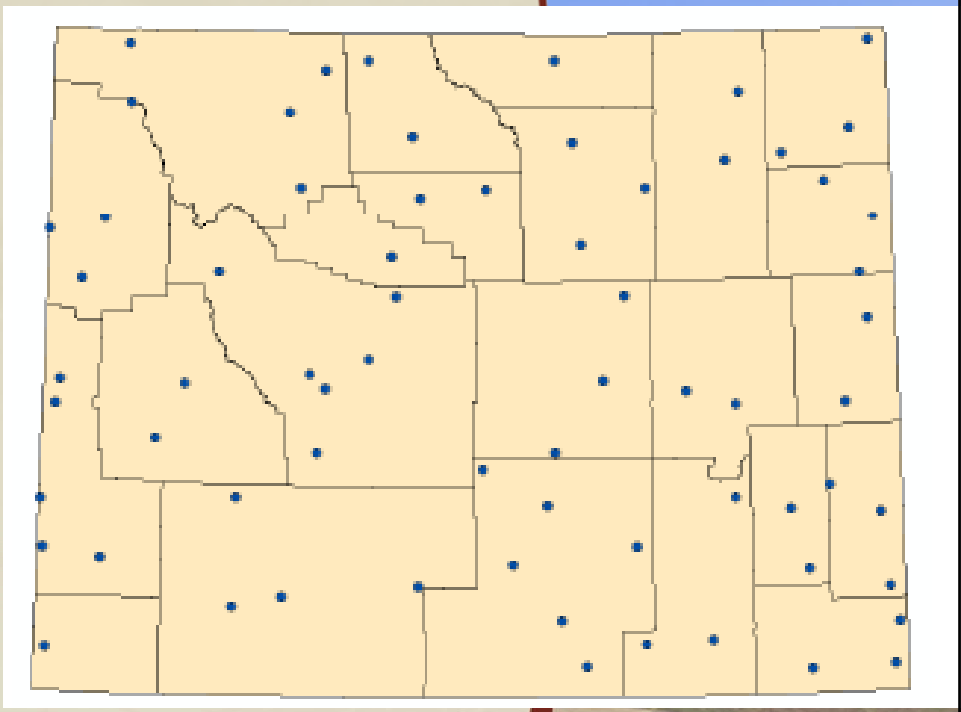


Scope-of-Work

- Tasks
  - Task 1. Meetings
  - ***Task 2. Literature Review***
  - ***Task 3. Surface Water Profile Update***
  - ***Task 4. Available Surface Water Determination***
  - Task 5. Demand Projections
  - Task 6. Future Water Use Issues and Topics
  - Task 7. Strategies
  - Task 8. Presentation Tool
  - Task 9. Discretionary Task
  - Task 10. Basin Planning Report
- Deliverables
  - Technical Memoranda
  - Technical Analysis Products and Models
  - Basin Planning Report

Task 3. Surface Water Profile Update - Progress

- 3A – Agricultural Water Use
  - Collected Cropping Pattern Data
  - Worked with WRDS to Develop Spatially Variable GIS-Based CIR Estimates (Pochop)
  - Working with SEO to Verify Irrigated Lands from Previous Basin Plan
  - Inserted Diversion Data into Database



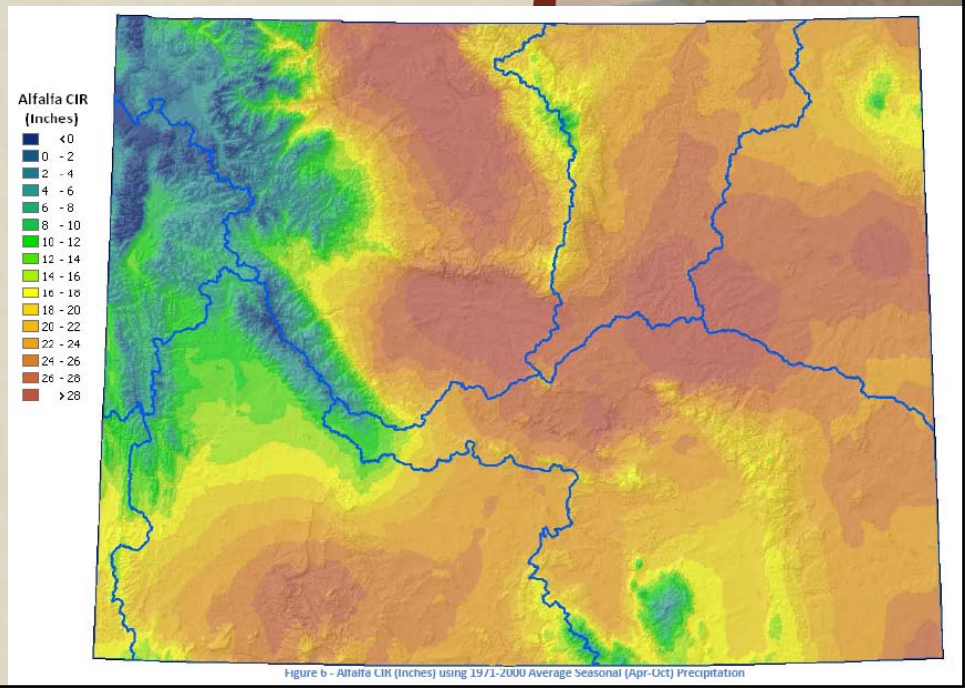
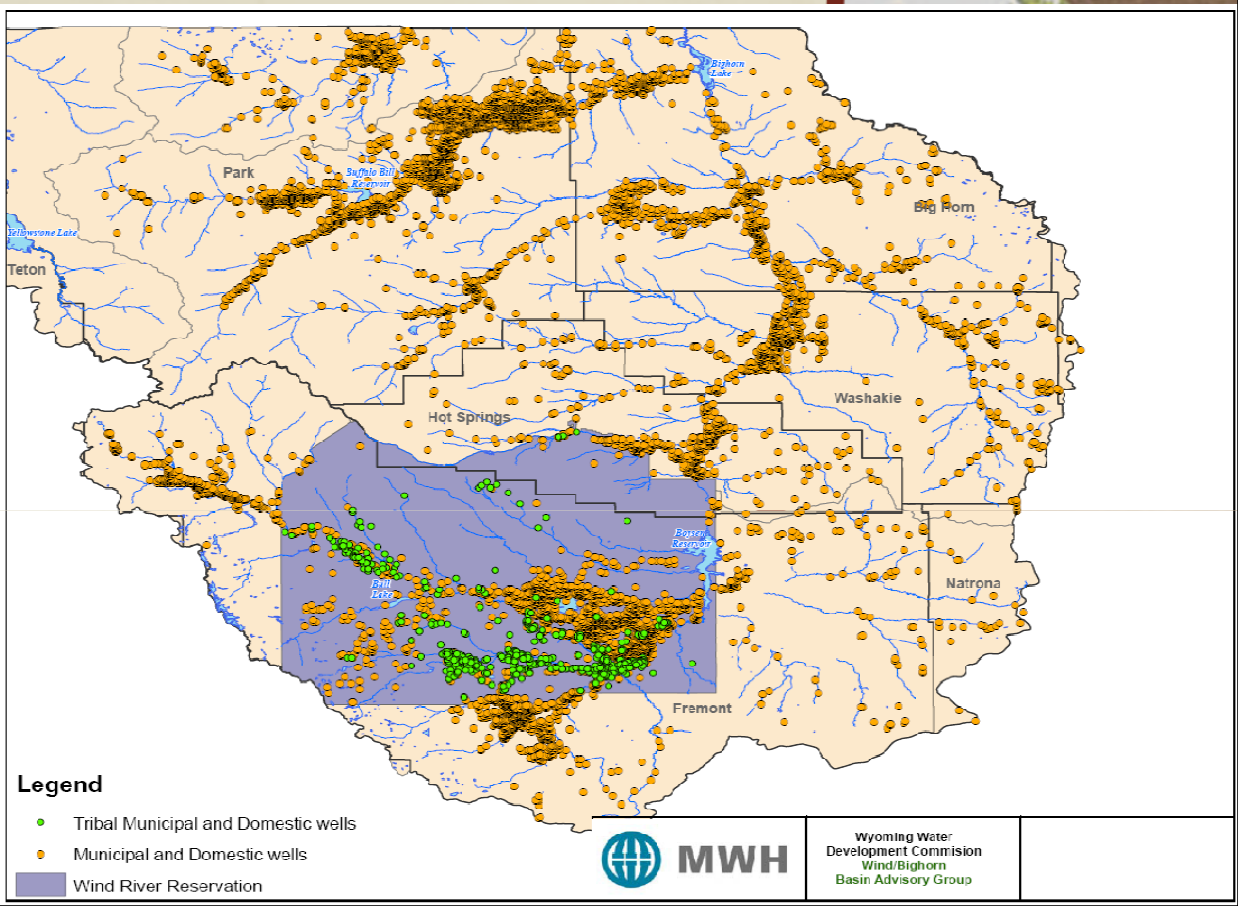


Figure 6 - Alfalfa CIR (Inches) using 1971-2000 Average Seasonal (Apr-Oct) Precipitation

Task 3. Surface Water Profile Update - Progress

- 3B – Municipal and Domestic Water Use
  - Reviewed and Summarized 2007 WWDO Water System Survey Report
  - Obtained Well GIS Layers from WSGS
  - Developed Water Use Estimates
  - Completing Draft Tech Memo

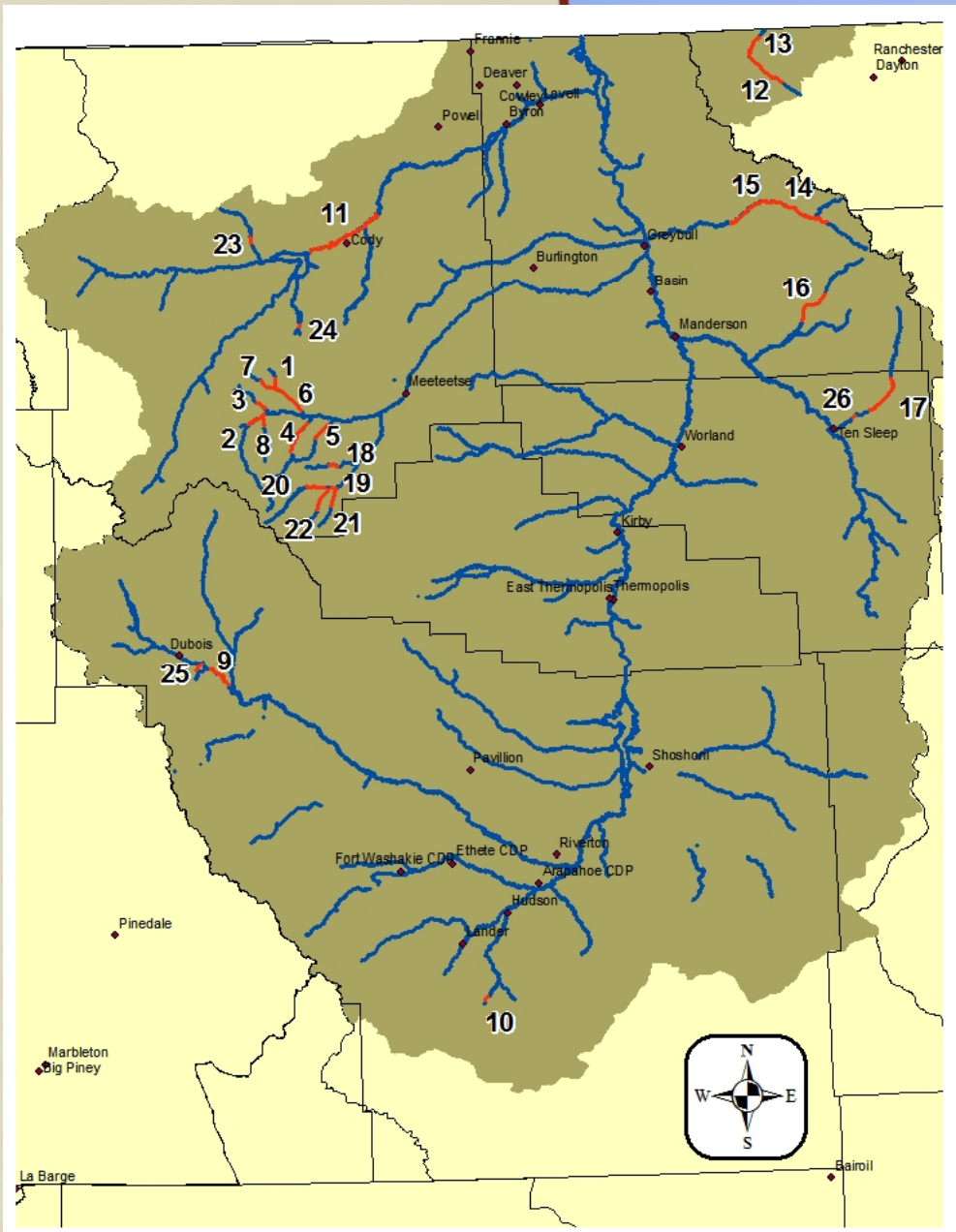


Task 3. Surface Water Profile Update – Progress, cont'd

- 3C – Industrial Water Use
  - Obtained Well GIS Layers from WSGS
  - Developing Water Use Estimates
  - Completing Draft Tech Memo
- 3D – Recreational Water Use
  - Obtained Recreation-related GIS Layers
  - Obtained Fishing License Statistics
  - Contacted Rafting Company
  - Completing Draft Tech Memo (combined with 3E)

Task 3. Surface Water Profile Update – Progress, cont'd

- 3E – Environmental Water Use
  - Obtained Instream Flow Permit Information from Game & Fish
    - Existing Permits
    - Reaches of Interest
  - Obtained Wetlands Information
  - Completing Draft Tech Memo (combined with 3D)

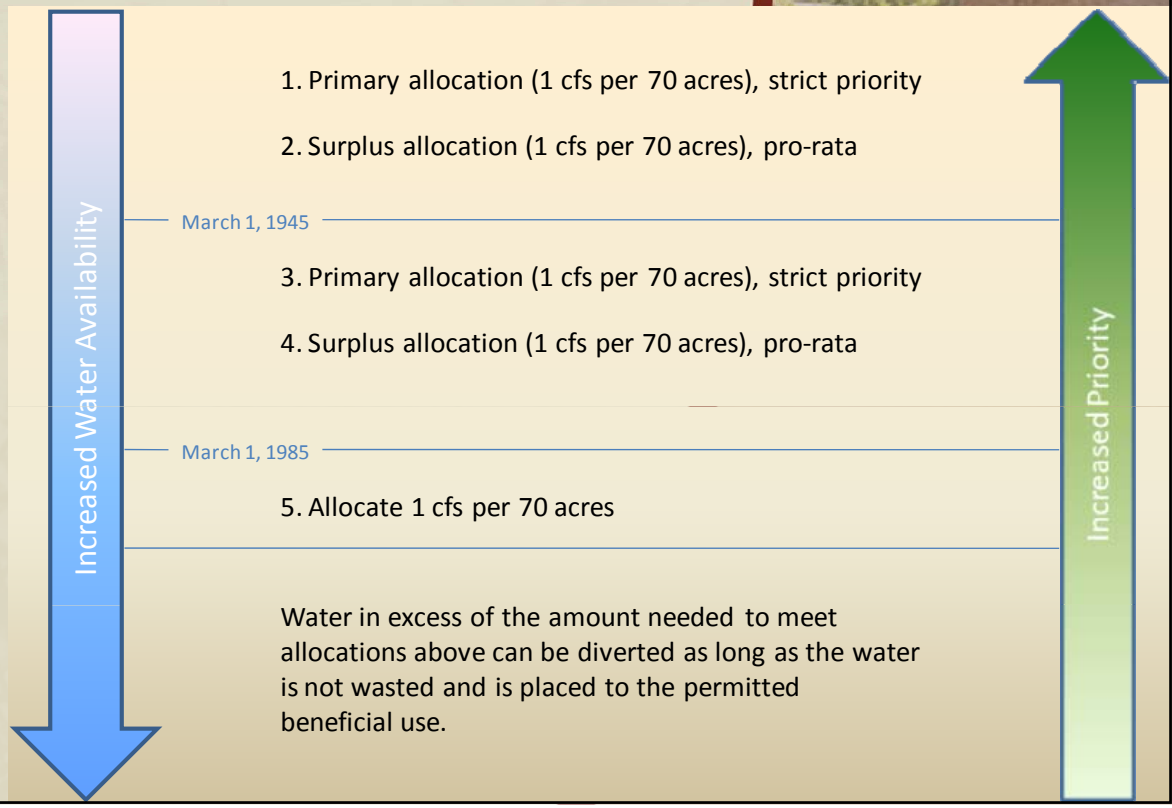


Task 3. Surface Water Profile Update – Progress, cont'd

- 3F –Water Use from Storage
  - Updated Historical E-O-M Contents
  - Updating Evaporation Data
  - Completing Draft Tech Memo
- 3G – BAG Water Related Concerns
  - Will Begin Tech Memo Following Tonight's Meeting

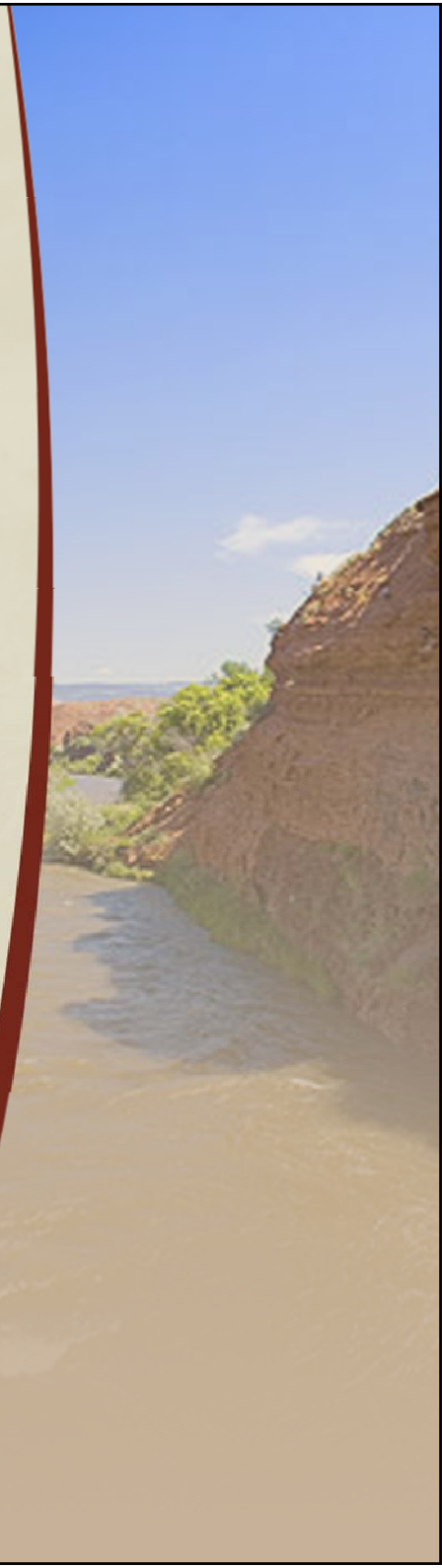
Task 3. Surface Water Profile Update – Progress, cont'd

- 3H – Water Law and Water Administration
  - Submitted Draft Tech Memo to WWDO
  - Currently Under Review by SEO
  - Includes
    - Wyoming Water Law
    - Bighorn Adjudication
    - Yellowstone River Compact
    - Division III Administration

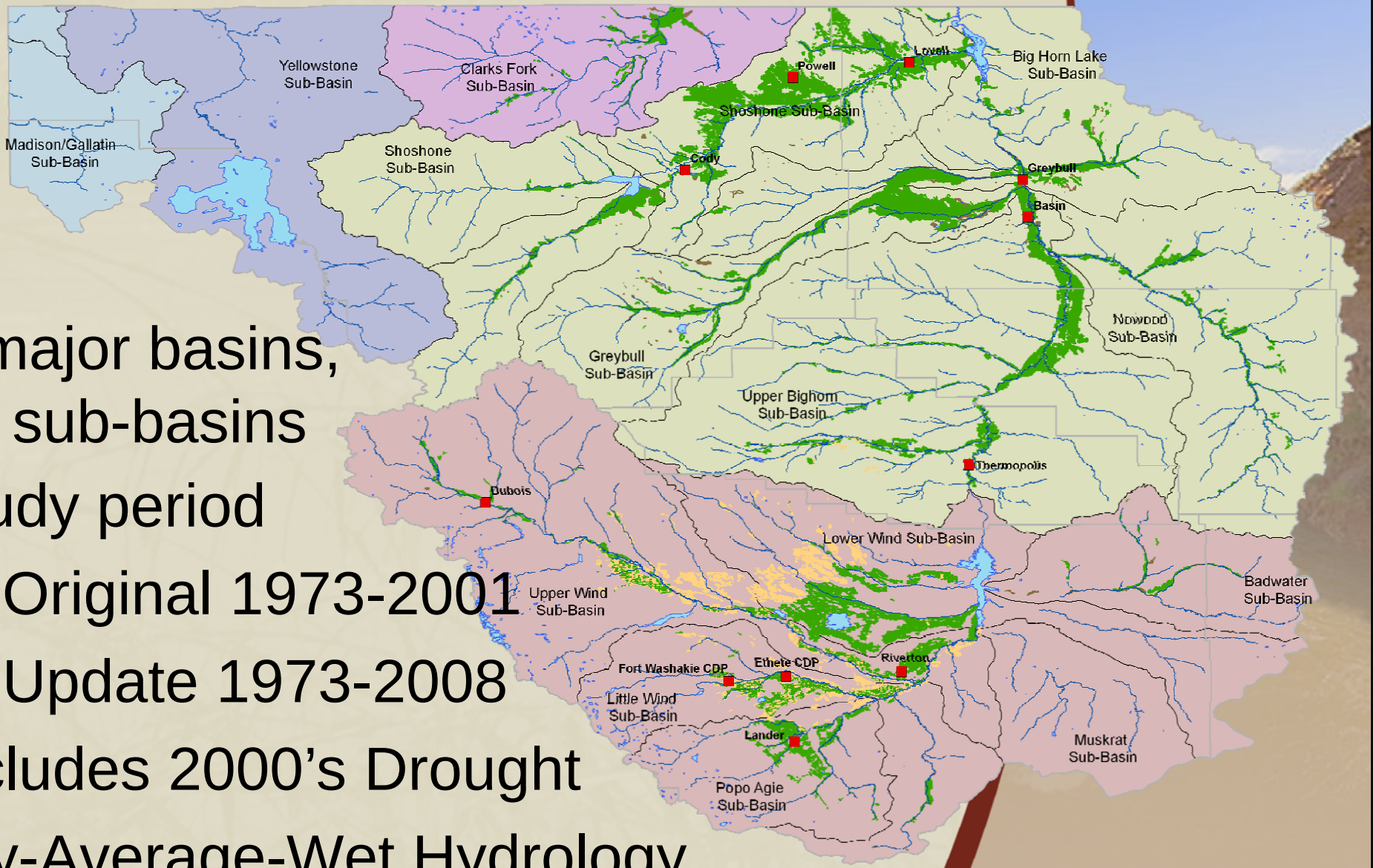


Task 4. Available Surface Water Determination

- Developed and Populated Hydrology Database
- Summarized Historical Data
- Developed Dry-Avg-Wet Year Hydrology
- Worked with WRDS to Develop Spatially Variable Precipitation Data
- Completing Draft Tech Memo 3A – Surface Water Hydrology
- Worked with WWDO to Develop Alternatives to StateMod Model



Surface Water Hydrology Review

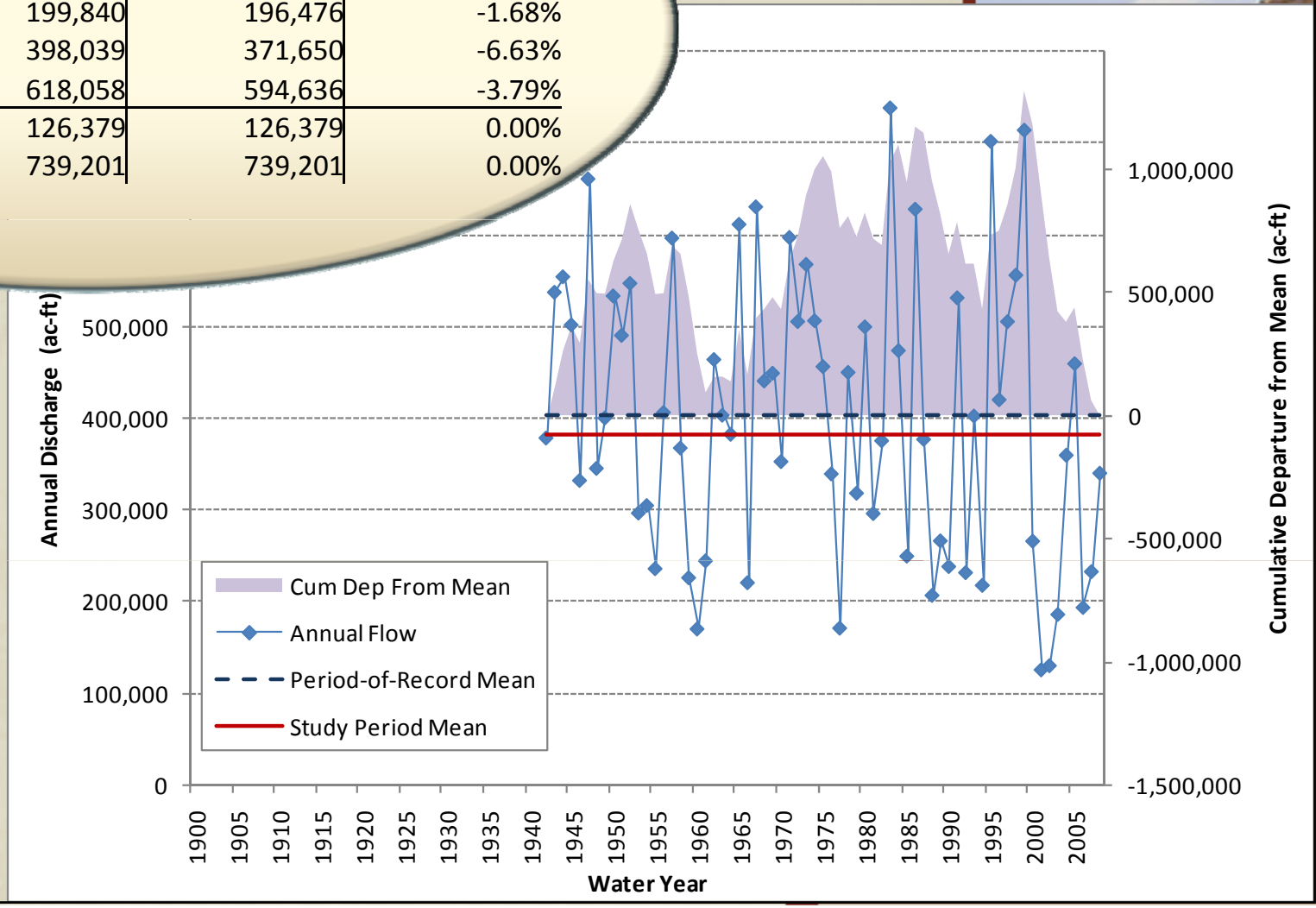


- 5 major basins, 18 sub-basins
- Study period
  - Original 1973-2001
  - Update 1973-2008
- Includes 2000's Drought
- Dry-Average-Wet Hydrology

Study Period Comparison

Little Wind Near Riverton

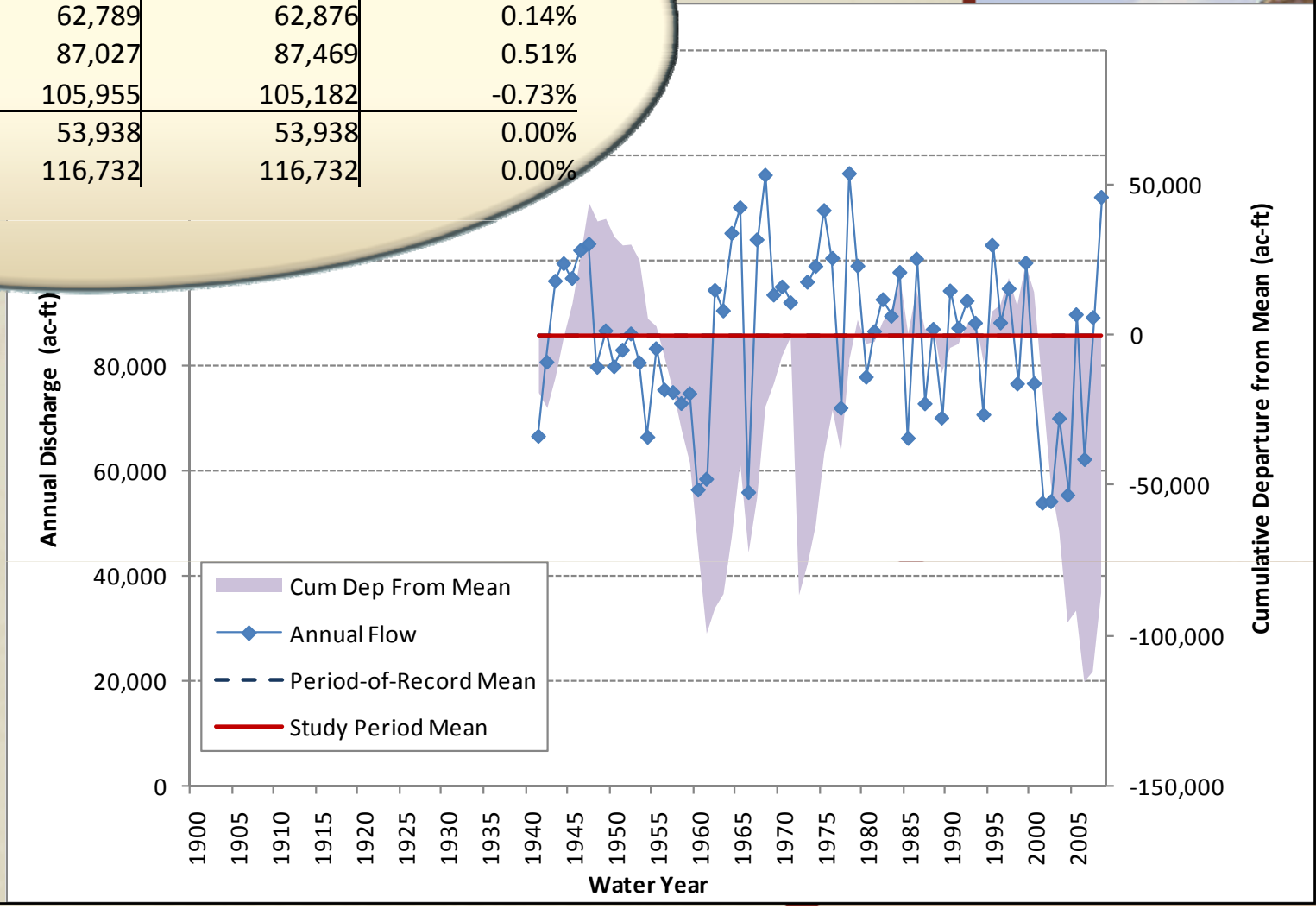
Statistic	Period-of-Record 1942 – 2008	Study Period 1973-2008	Percent Difference
Mean	402,598	382,275	-5.05%
Standard Deviation	153,855	168,096	9.26%
Average – Dry Years	199,840	196,476	-1.68%
Average – Average Years	398,039	371,650	-6.63%
Average – Wet Years	618,058	594,636	-3.79%
Minimum	126,379	126,379	0.00%
Maximum	739,201	739,201	0.00%



Study Period Comparison

Shell Creek near Shell

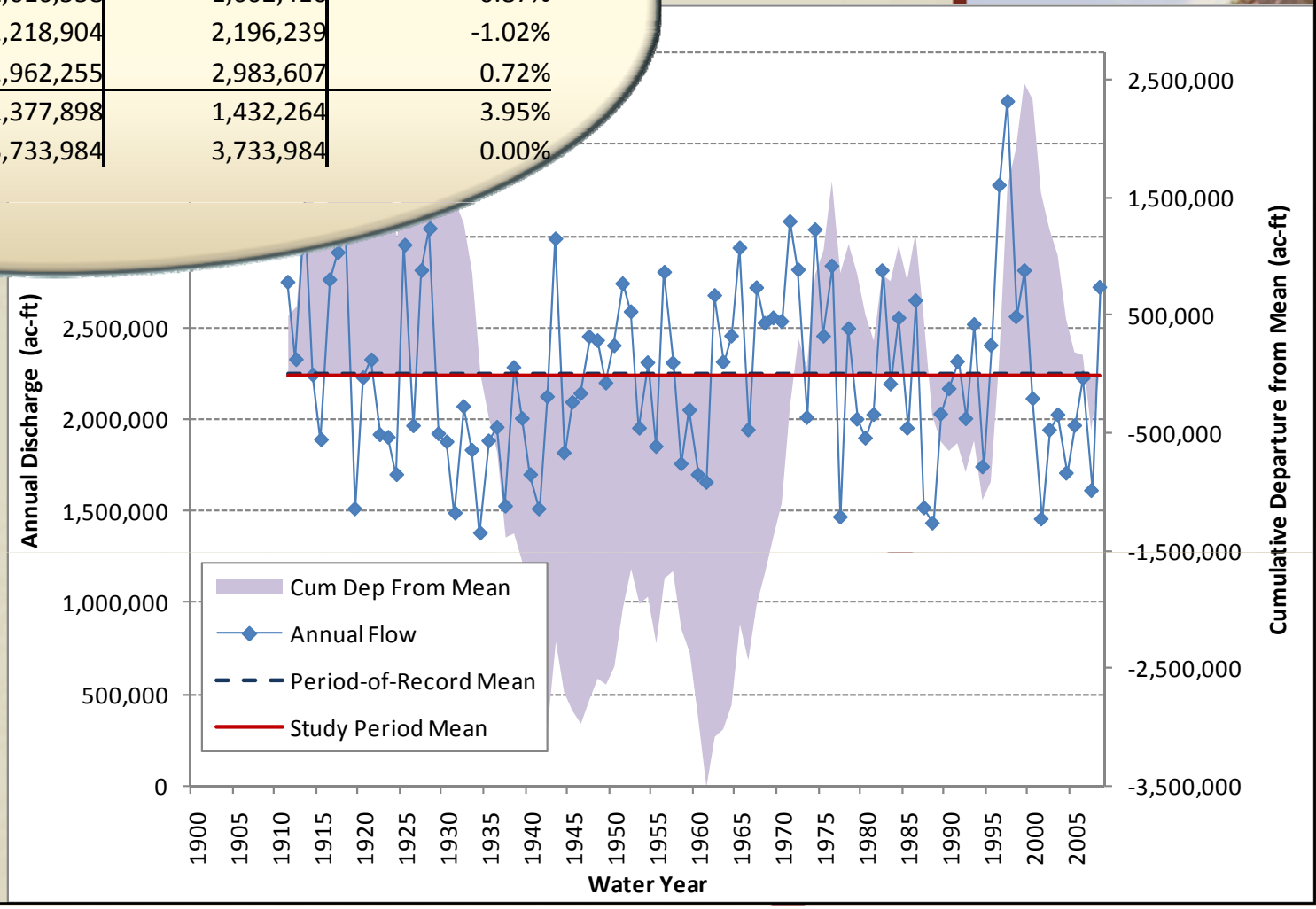
Statistic	Period-of-Record 1941 – 2008	Study Period 1973-2008	Percent Difference
Mean	85,918	85,940	0.03%
Standard Deviation	15,878	16,240	2.28%
Average – Dry Years	62,789	62,876	0.14%
Average – Average Years	87,027	87,469	0.51%
Average – Wet Years	105,955	105,182	-0.73%
Minimum	53,938	53,938	0.00%
Maximum	116,732	116,732	0.00%



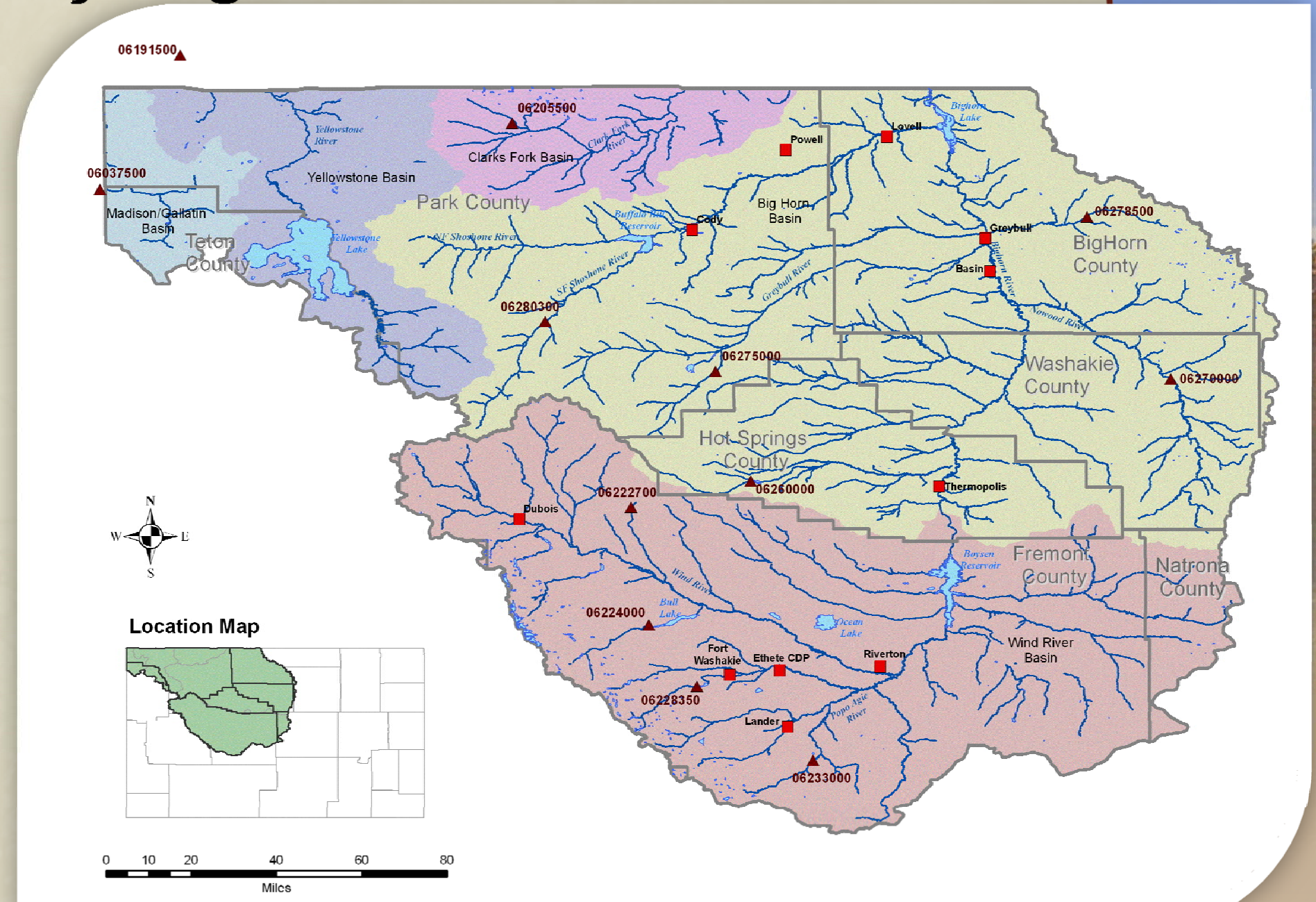
Study Period Comparison

Yellowstone River at Corwin Springs

Statistic	Period-of-Record 1911 – 2008	Study Period 1973-2008	Percent Difference
Mean	2,247,681	2,239,249	-0.38%
Standard Deviation	490,463	528,642	7.78%
Average – Dry Years	1,616,558	1,602,416	-0.87%
Average – Average Years	2,218,904	2,196,239	-1.02%
Average – Wet Years	2,962,255	2,983,607	0.72%
Minimum	1,377,898	1,432,264	3.95%
Maximum	3,733,984	3,733,984	0.00%

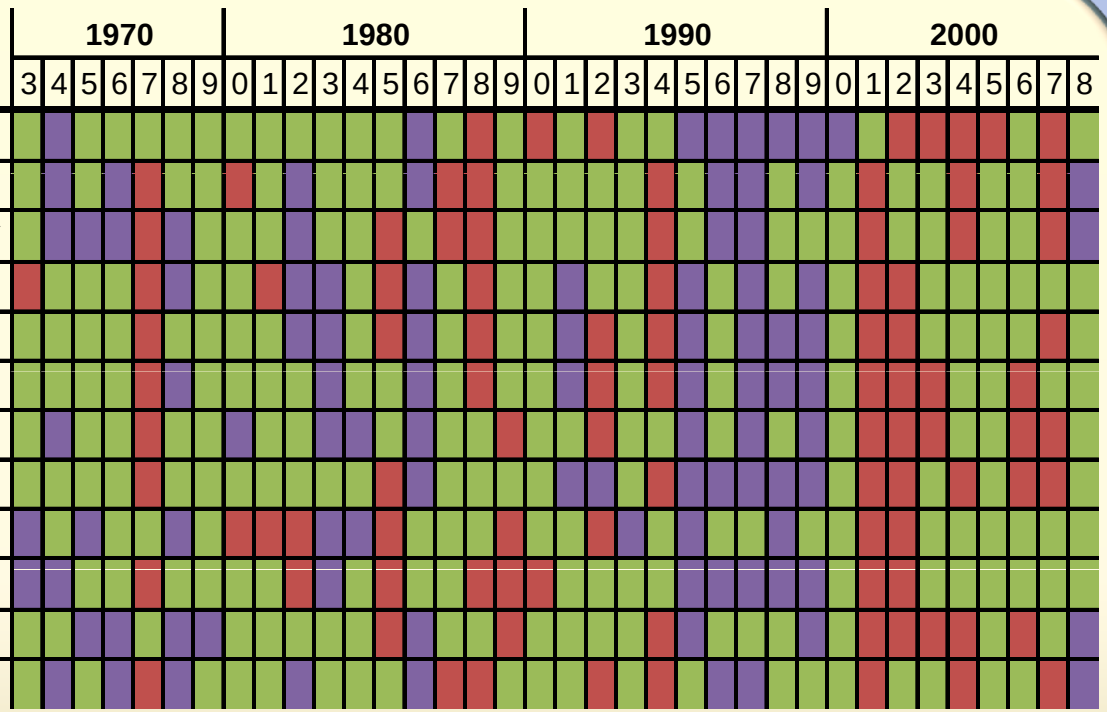


Key Gages


06191500
06205500
Clarks Fork Basin
Clark Fork River
Yellowstone River
06037500
Yellowstone Basin
Madison/Gallatin Basin
Teton County
Park County
Yellowstone Lake
Buffalo Bill Reservoir
NF Shoshone River
SF Shoshone River
Cody
Powell
Lovell
Bighorn Lake
Big Horn Basin
Greybull
Basin
Greybull River
Bighorn River
Nowood River
06278500
BigHorn County
06280300
06275000
Washakie County
06270000
Hot Springs County
06260000
Thermopolis
06222700
Dubois
Wind River
Bull Lake
Boysen Reservoir
Fremont County
Natrona County
06224000
Ocean Lake
Fort Washakie
Ethete CDP
Riverton
Wind River Basin
06228350
Lander
Popo Agie River
06233000
N
W
E
S
Location Map
0 10 20 40 60 80
Miles

Hydrologic Year Classification

Gage No.	Gage Name
06037500	Madison River Near West Yellowstone MT
06191500	Yellowstone River At Corwin Springs MT
06205500	Clarks Fk Yellowstone R Ab Squaw C Nr Painter,WY
06222700	Crow C Nr Tipperary WY
06224000	Bull Lake Creek Above Bull Lake, WY
06228350	Sf L Wind R Ab Washakie Re Nr Ft Washakie WY
06233000	Little Popo Agie River Near Lander, WY
06260000	South Fork Owl Creek Near Anchor, WY
06270000	Nowood River Near Tensleep, WY
06275000	Wood River At Sunshine, WY
06278500	Shell Creek Near Shell, WY
06280300	South Fork Shoshone River Near Valley, WY

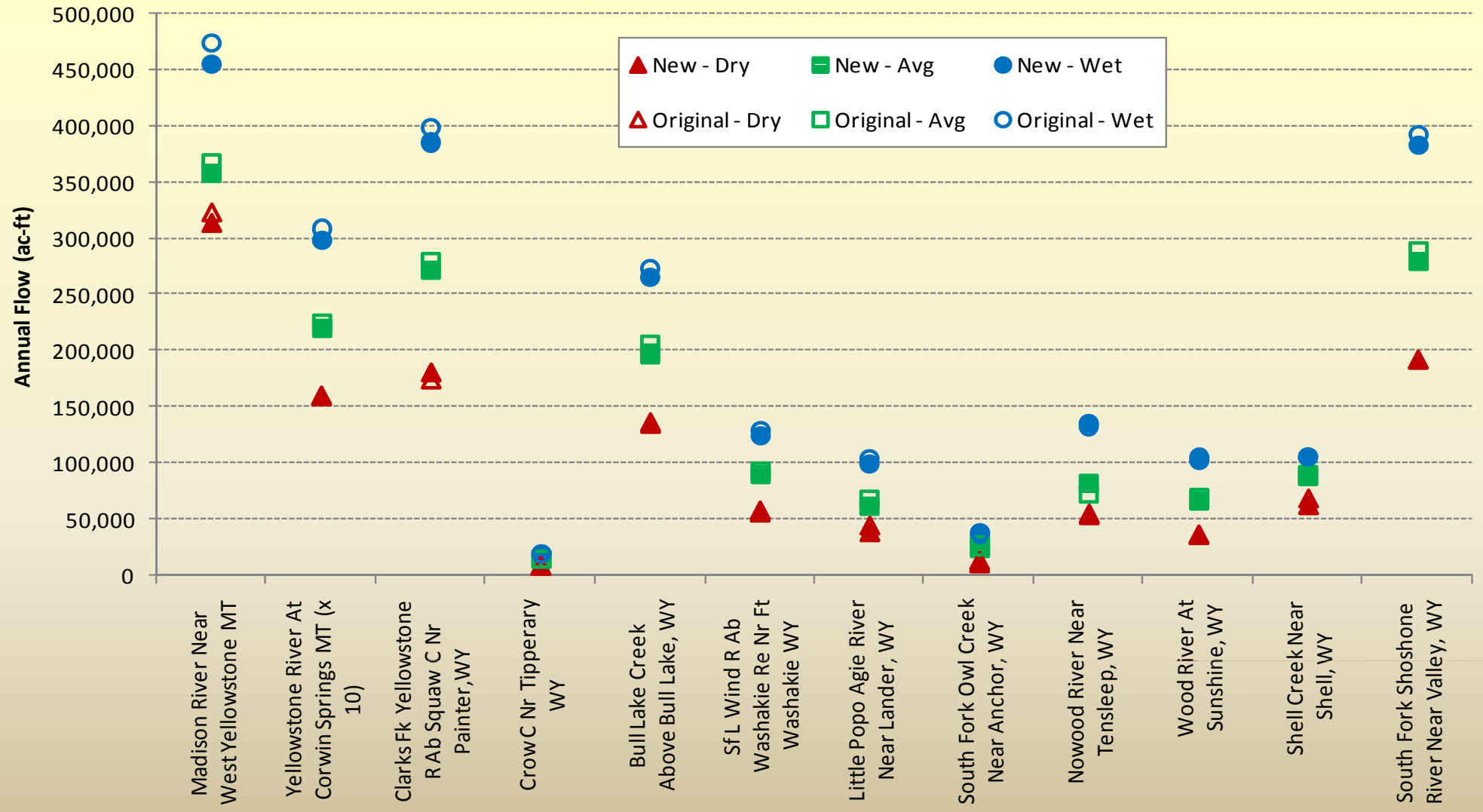


Notes:

(1) Hydrologic Year Classification

- Dry Year (Driest 20 percent of years in study period)
- Average Year (Middle 60 percent of years in study period)
- Wet Year (Wettest 20 percent of years in study period)

Differences in Hydrology Original and New Hydrology



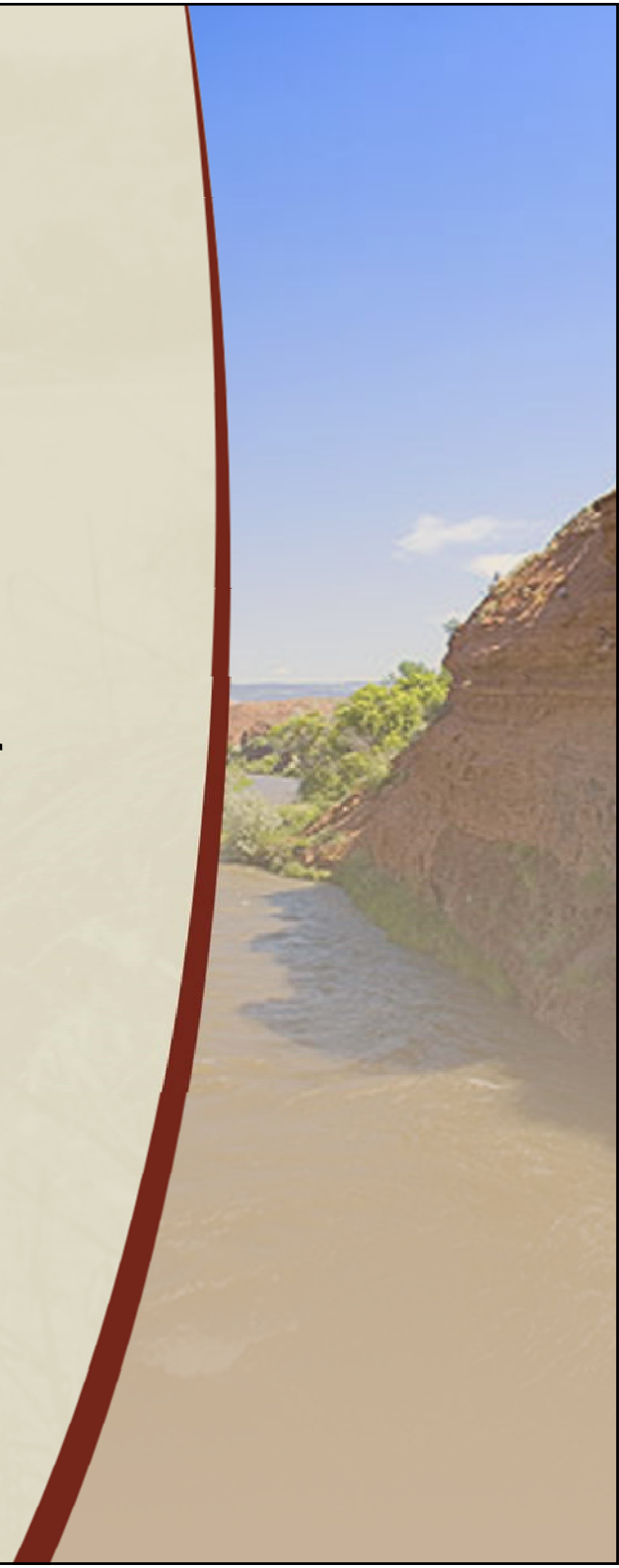
Diff % - Dry	-3%	1%	4%	14%	2%	-2%	-11%	-10%	5%	5%	-7%	0%
Diff % - Avg	-3%	-3%	-3%	-5%	-5%	-4%	-10%	-8%	13%	-5%	-2%	-4%
Diff % - Wet	-4%	-3%	-3%	0%	-3%	-3%	-5%	-3%	2%	-3%	0%	-2%

Hydrology – Next Steps

- Finalize Native Flow Estimates
- Finalize Ag CIR/Diversion Estimates
- Work with Div. III to Ensure Schematics are Correct
- Insert Raw Data Into Model
- Run Model
- Determine Scenarios
- Develop Estimates of Shortages and Water Availability

Upcoming Activities

- Complete Task 3 Tech Memos
- Complete Surface Water Hydrology Tech Memo (Task 4A)
- Complete Preliminary Surface Water Hydrology Results
- Prepare Information for Task 6



THANK YOU!