Out-of-Stream Water Needs
Preliminary Results
Yakima River Basin Study
Workgroup Meeting
June 23, 2010

Disclaimer

- Results discussed today are working drafts
- Data and calculations are still being checked and results may change

Framework for the Assessment

1. Current Conditions
   - Agriculture – Yakima Irrigation Project (federal supply)
   - Agriculture – non-federal supplies
   - Municipal Systems
   - Domestic wells
   - Other uses

2. Future Needs
   - Population growth
   - Conversion of farmland to urban use
   - New or additional conservation
   - Alternative crop mixes
   - Climate change effects

Yakima Project Agricultural Needs Analysis

Outline

- Current Entitlements and Diversions
- Measures of Proratable District Shortfalls
- Irrigated Crop Census, Crop Water Requirements
- Return Flows

Summary of Annual Entitlements (April-October) Diverting Surface Water above Parker Gage (ac-ft)

Irrigation Entity	Proratable Entitlements	Non-Proratable Entitlements	Total Entitlements
Wapato Irrigation Project	350,000	305,613	655,613
Sunnyside Division	142,684	315,836	458,520
Roza Irrigation District	375,000	0	375,000
Kittitas Reclamation District	336,000	0	336,000
Yakima-Tieton Irrigation District	38,181	75,865	114,049
Naches Selah Irrigation District	4,486	49,658	54,144
Cascade Ditch	0	49,525	49,525
Ellensburg Town Ditch	0	47,758	47,758
Westside Irrigation Company	8,200	31,128	39,328
Selah Moxee Irrigation District	4,281	27,493	31,774
Congdon Ditch	4,305	23,720	28,025
Union Gap Irrigation District	4,606	20,697	25,303
South Naches Ditch	0	22,946	22,946
Gleed Ditch	0	22,819	22,819
Wapatox Ditch	0	20,230	20,230
Fruitvale Ditch	0	17,708	17,708
Old Union Ditch	0	17,675	17,675
Naches Cowiche Ditch	0	15,096	15,096
Woldale Ditch	0	12,973	12,973
Hubbard Ditch	0	11,165	11,165
City of Yakima Irrigation	1,500	8,805	10,305
Others	11,560	120,248	131,805
Total	**1,280,803**	**1,216,958**	**2,497,761**

Source: Reclamation (TS-YSS-21, January 2008); Not checked against final *Acquavella* results.

Summary of Annual Diversions – Yakima Project Divisions above Parker

	KRD	Roza	WIP	Sunnyside	Tieton
Entitlements (April - October)	336,000	375,000	655,613	458,520	114,049
Peak Year Diversion (1990-2009)	322,588	377,679	665,298	460,892	88,097
Average Non-Drought Diversions (1990-2009)	285,478	312,849	559,092	429,122	79,029

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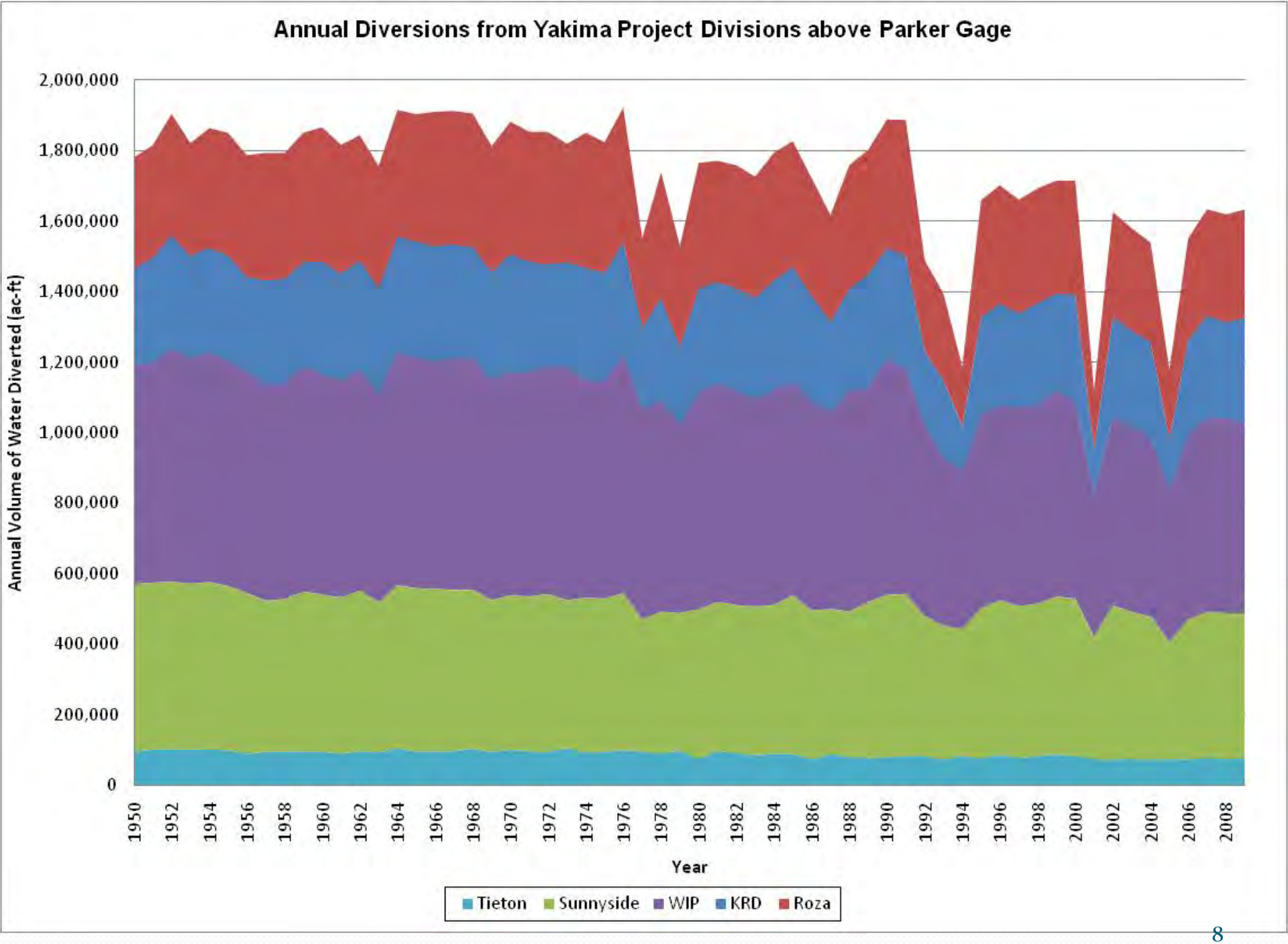
Annual Diversions from Yakima Project Divisions above Parker Gage
Annual Volume of Water Diverted (ac-ft)
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Year
Tieton
Sunnyside
WIP
KRD
Roza

Yakima Project Diversions Below Parker

- Kennewick Division is present below Parker gage
  - Proratable water right holder, relies on return flow for water supply
  - Diverts approximately 99,300 acre-feet per year
  - Was prorated in 2005, concern is with increasing water conservation return flow will decrease, affecting their water supply

Summary of Proratable Entitlements (April-October) Diverting Surface Water above Parker Gage

Irrigation Entity	Proratable Entitlements (ac-ft)	% of Total Proratable Entitlements	% of Total Proratable Entitlements Not Including Sunnyside and Tieton
Roza Irrigation District	375,000	29%	34%
Wapato Irrigation Project	350,000	27%	32%
Kittitas Reclamation District	336,000	26%	31%
Subtotal	***1,061,000***	***83%***	***96%***
Sunnyside Division	142,684	11%	
Yakima-Tieton Irrigation District	38,181	3%	
Subtotal	***1,241,865***	***97%***	
Others	38,938	3%	***4%***
Total	**1,280,803**	**100%**	**100%**

RID, WIP and KRD comprise 96% of the proratable entitlements that desire additional water during drought years.

Annual Diversions for Proratable Districts(acre-feet)

	KRD	Roza	WIP
Entitlements (April - October)	336,000	375,000	655,613
Peak Year Diversion (1990-2009)	322,588	377,679	665,298
Average Non-Drought Diversions (1990-2009)	285,478	312,849	559,092
Drought Year 2001 Diversions	122,780	166,690	404,645
Drought Year 2005 Diversions	144,662	192,573	428,080

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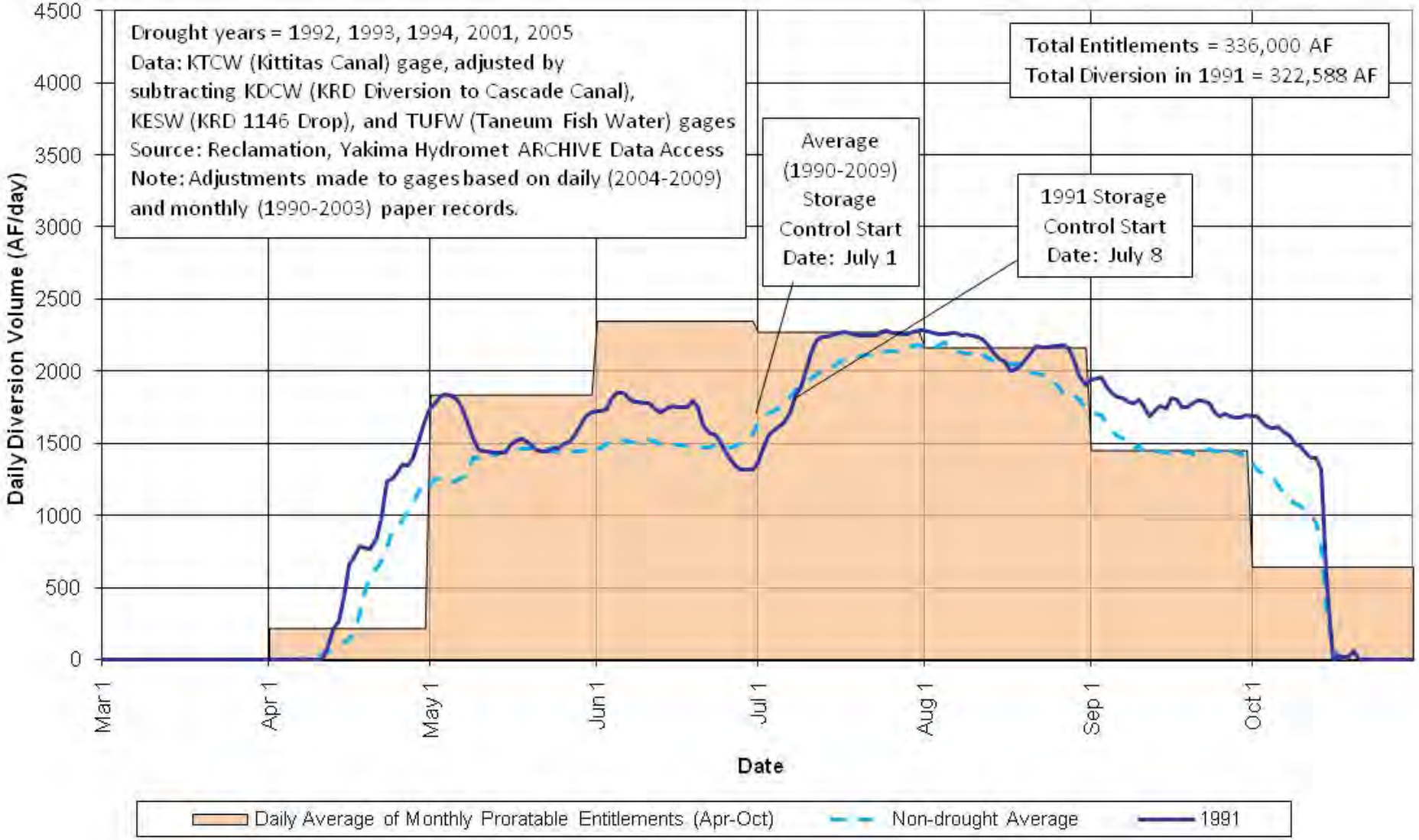
KRD Diversion Comparison
Average Non-Drought Years (1990-2009) vs. Maximum Diversion Year 1991



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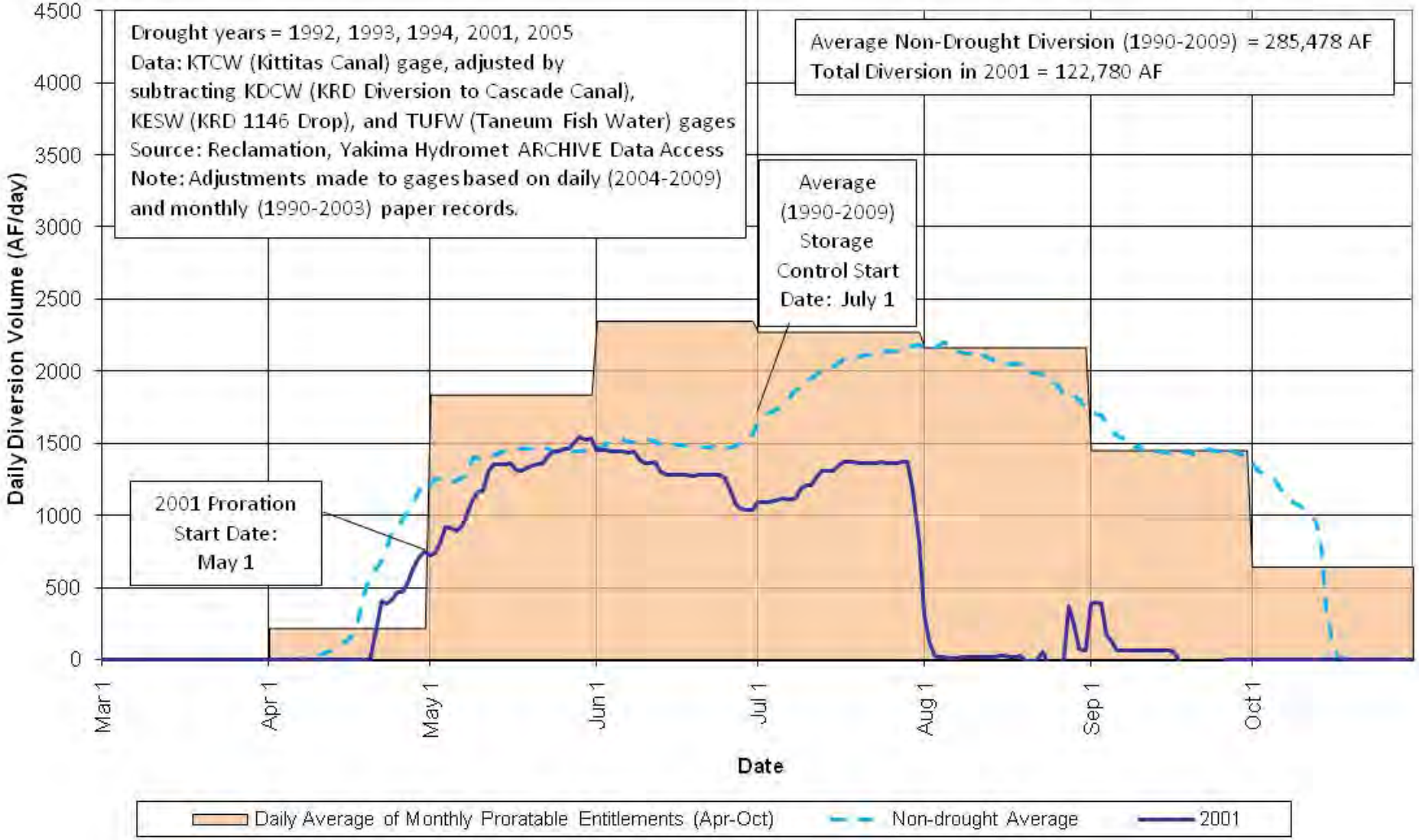
Provisional Results

KRD Diversion Comparison
Average Non-Drought Years (1990-2009) vs. Drought Year 2001



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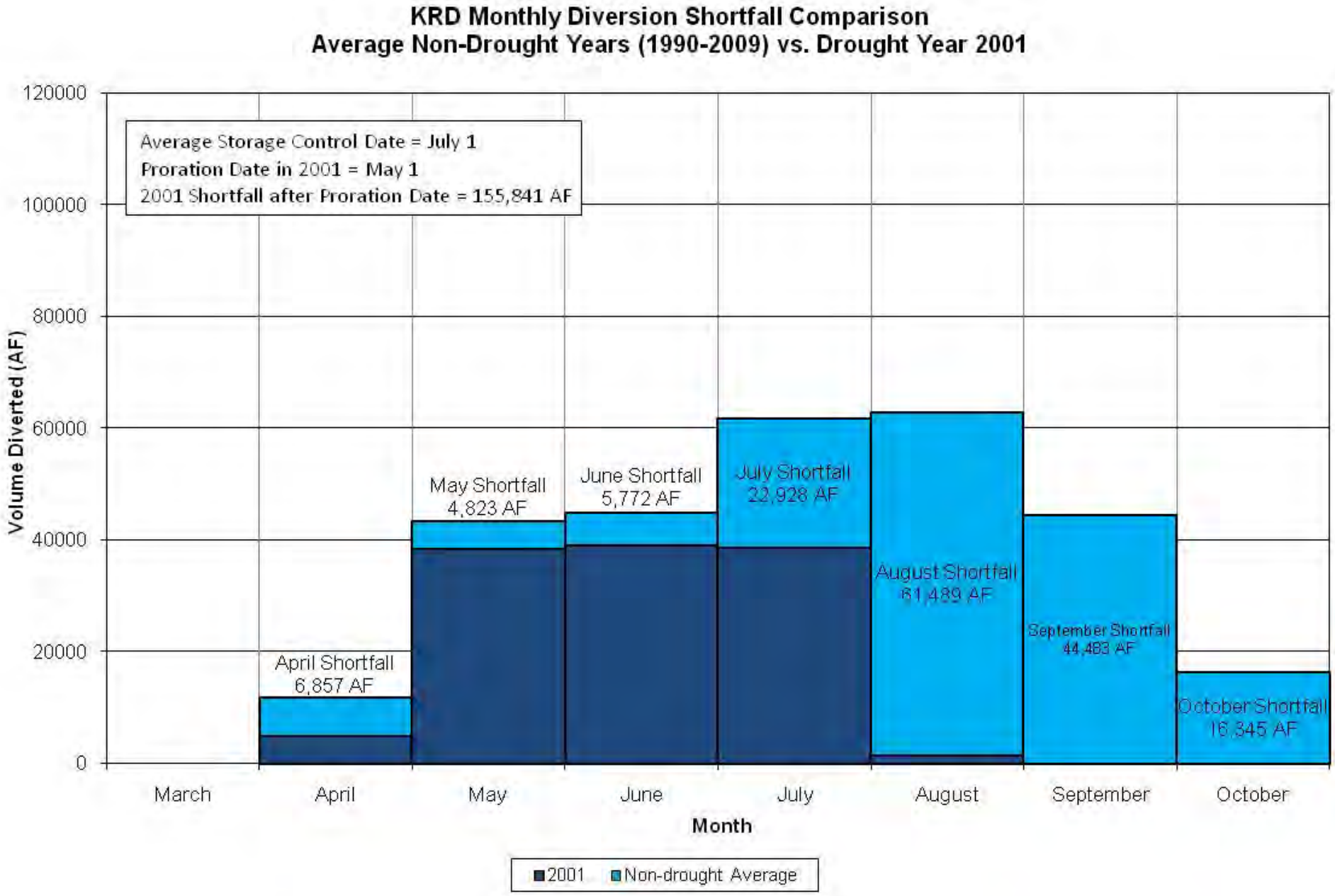

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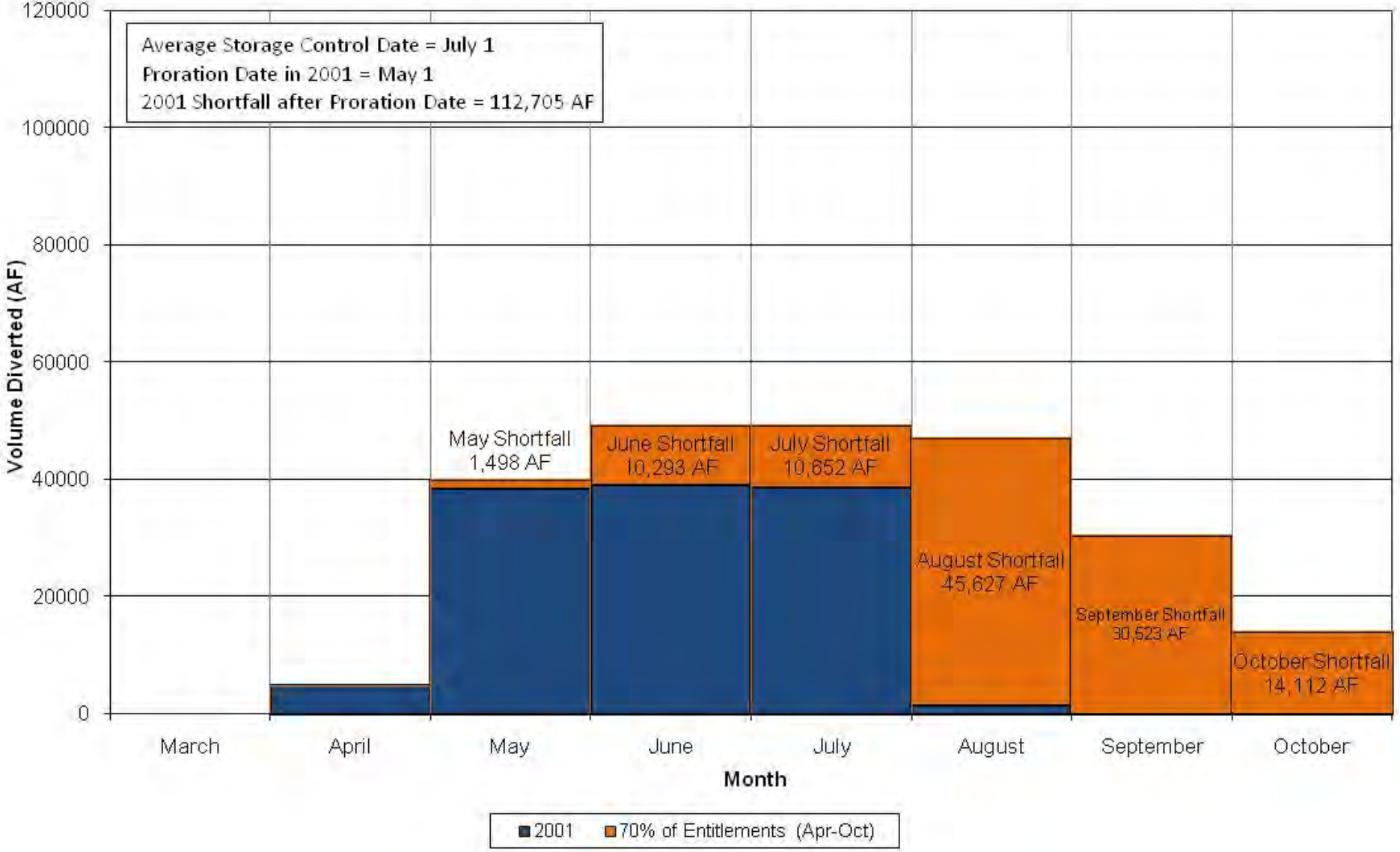
KRD Monthly Diversion Shortfall Comparison
70 Percent of Entitlements vs. Drought Year 2001



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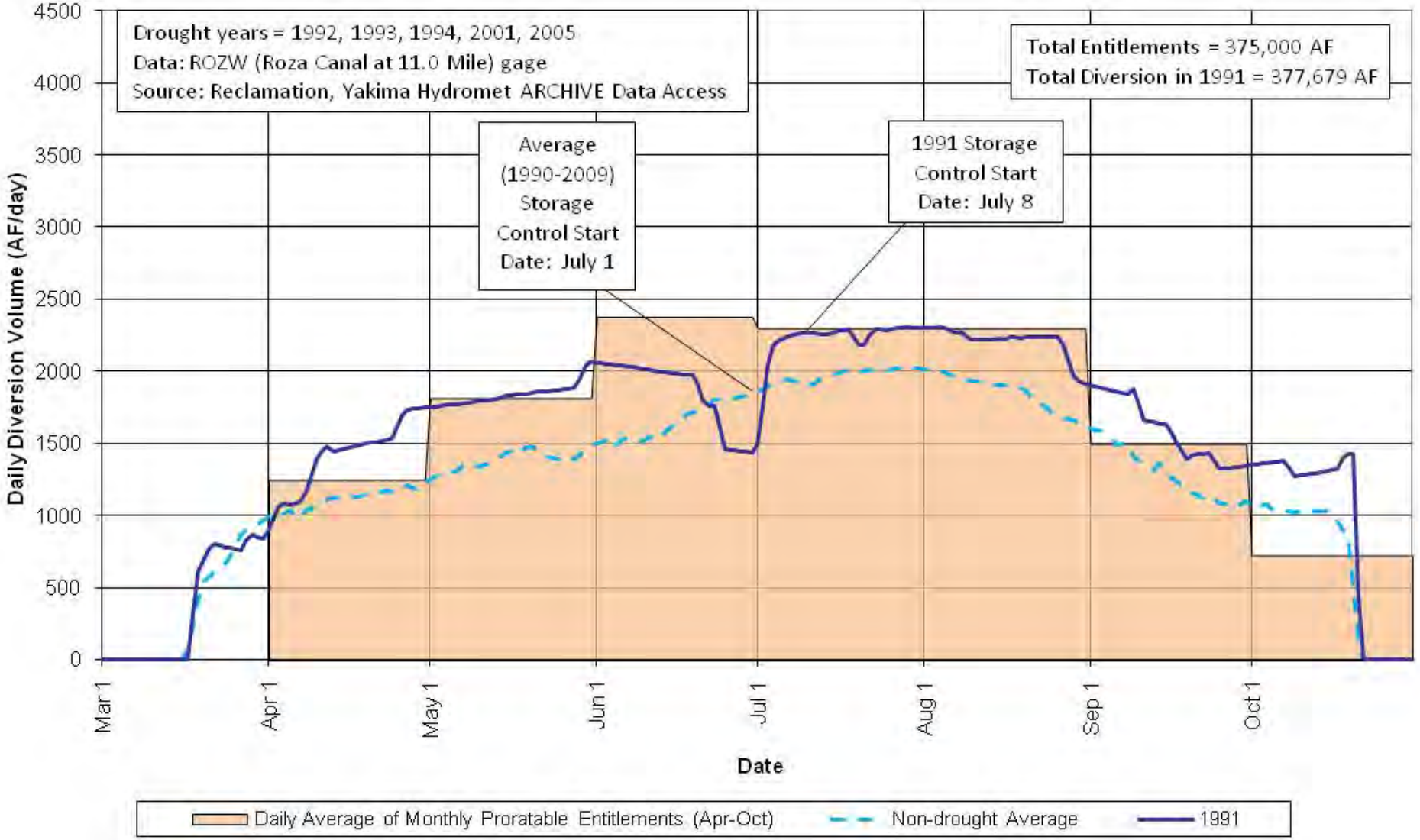
Roza Irrigation District Diversion Comparison
Average Non-Drought Years (1990-2009) vs. Maximum Diversion Year 1991



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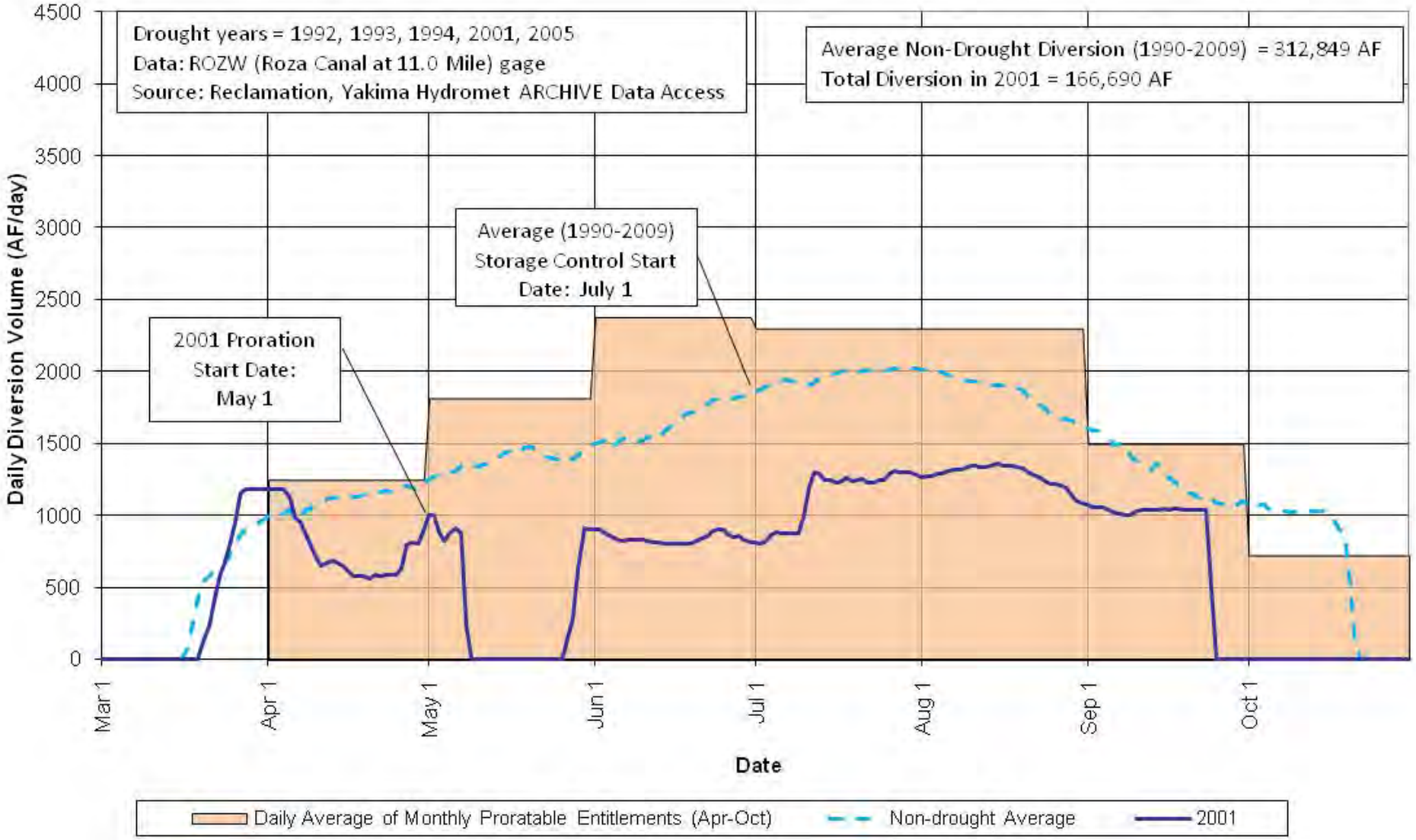
Provisional Results

Roza Irrigation District Diversion Comparison
Average Non-Drought Years (1990-2009) vs. Drought Year 2001



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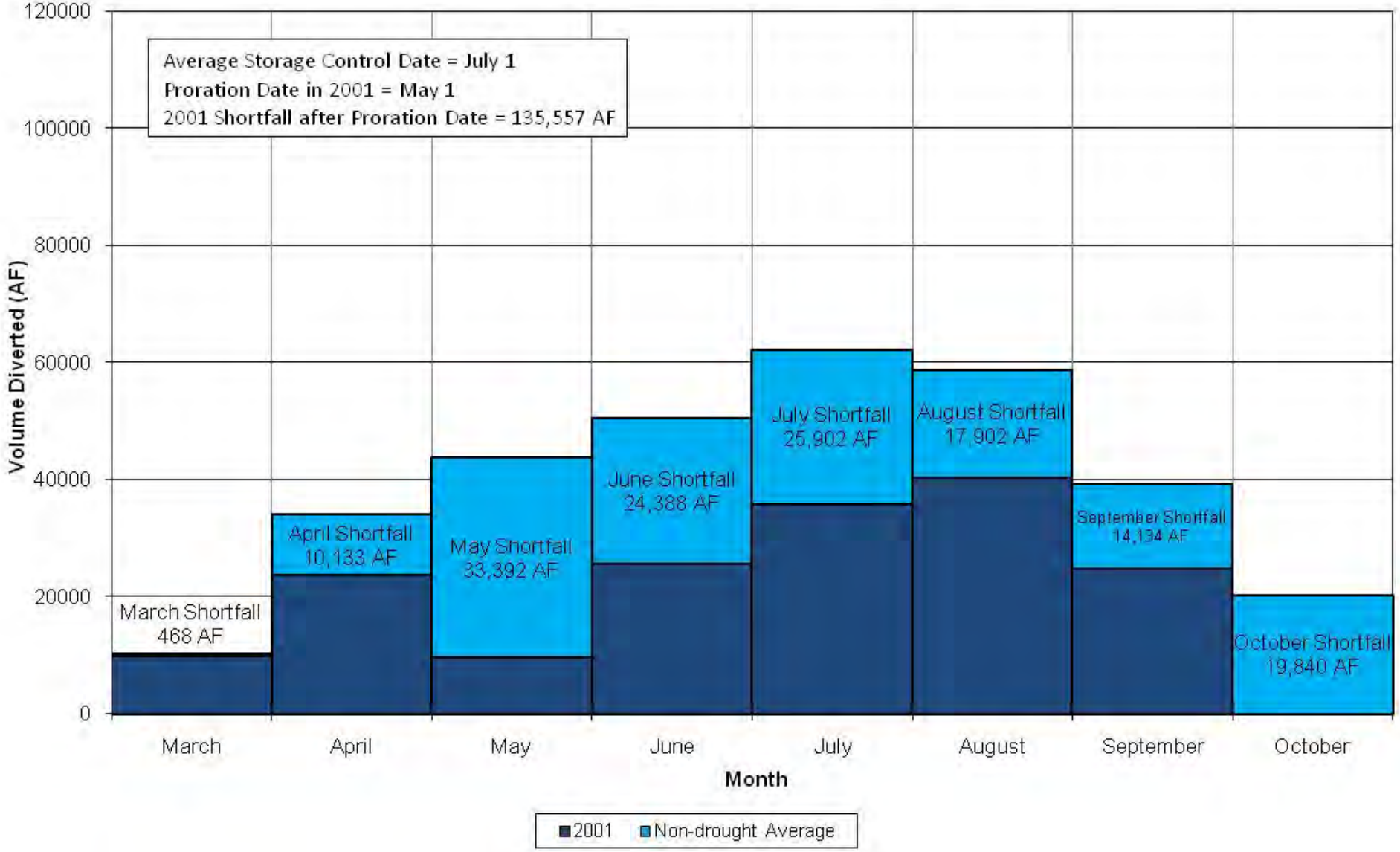
Provisional Results

Roza Irrigation District Monthly Diversion Shortfall Comparison
Average Non-Drought Years (1990-2009) vs. Drought Year 2001



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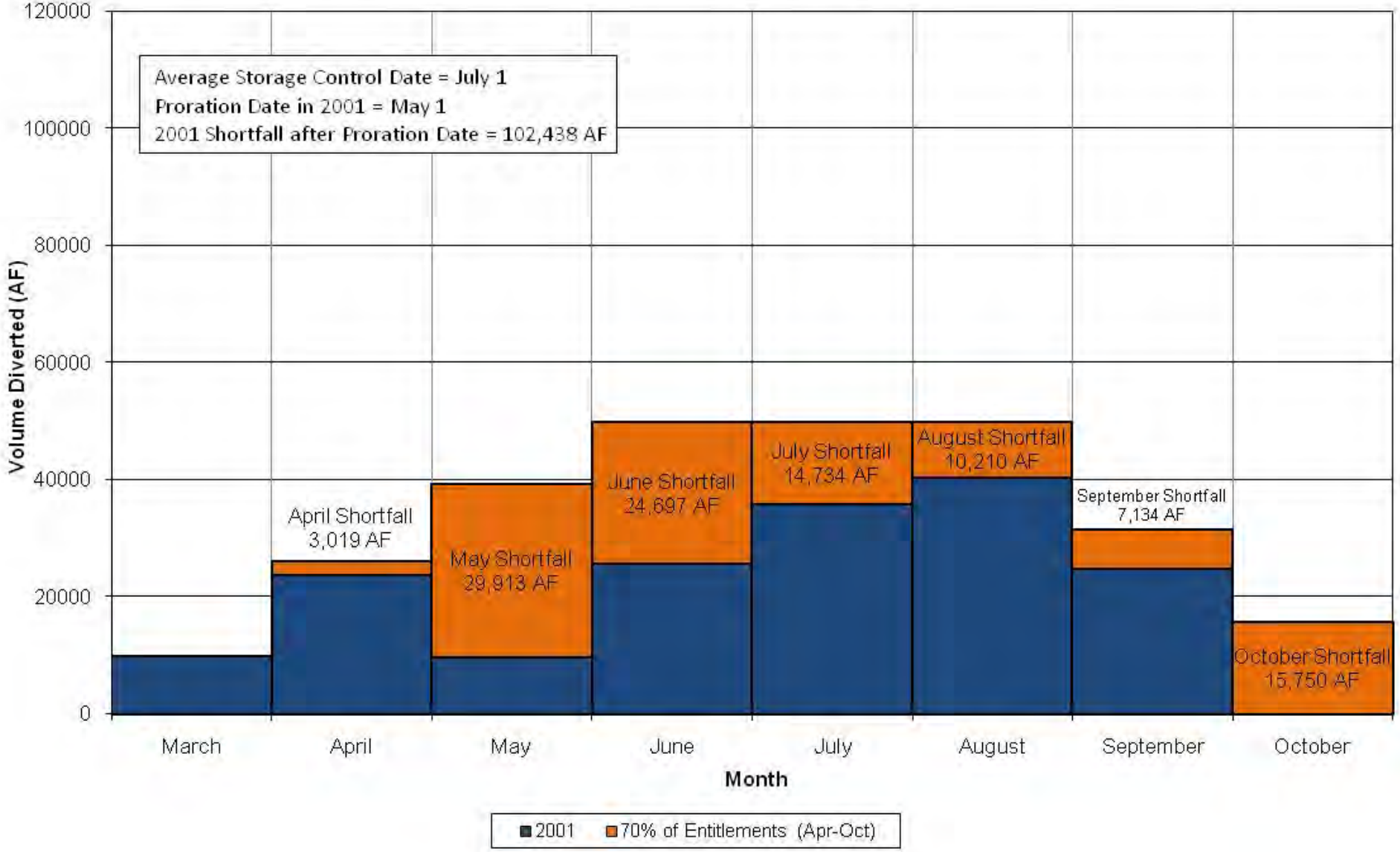
Roza Irrigation District Monthly Diversion Shortfall Comparison
70 Percent of Entitlements vs. Drought Year 2001



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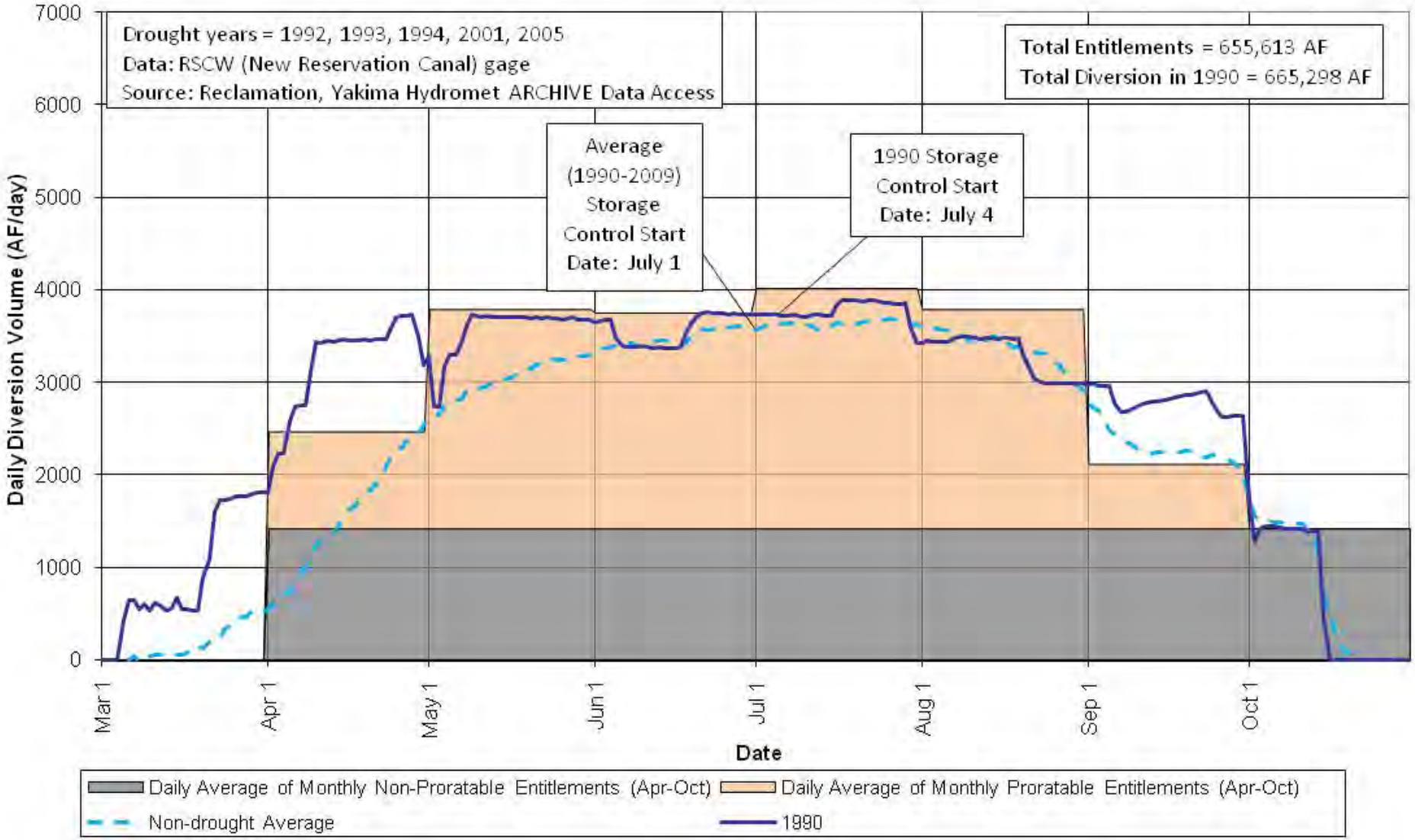
WIP Diversion Comparison
Average Non-Drought Years (1990-2009) vs. Maximum Diversion Year 1990



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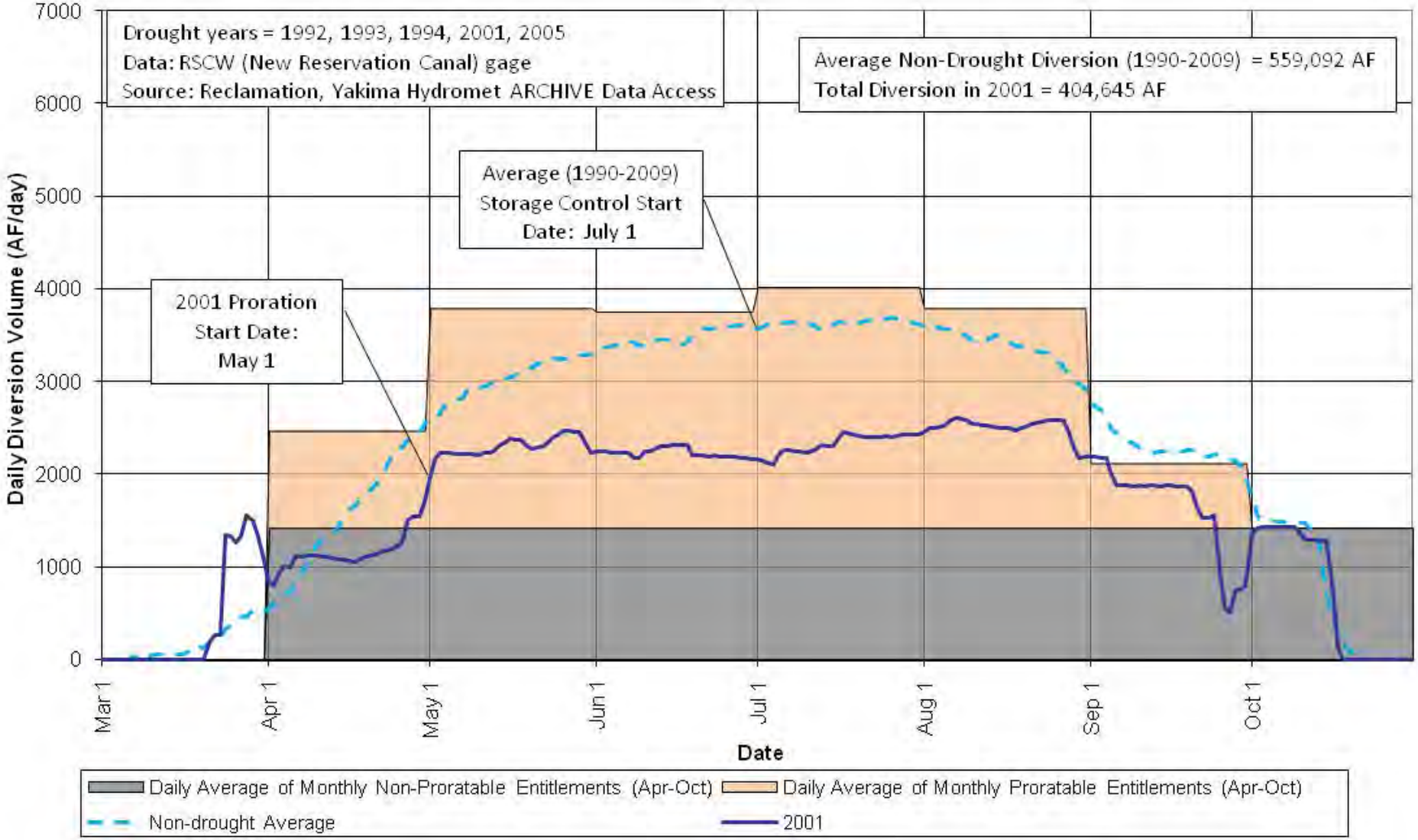
WIP Diversion Comparison
Average Non-Drought Years (1990-2009) vs. Drought Year 2001



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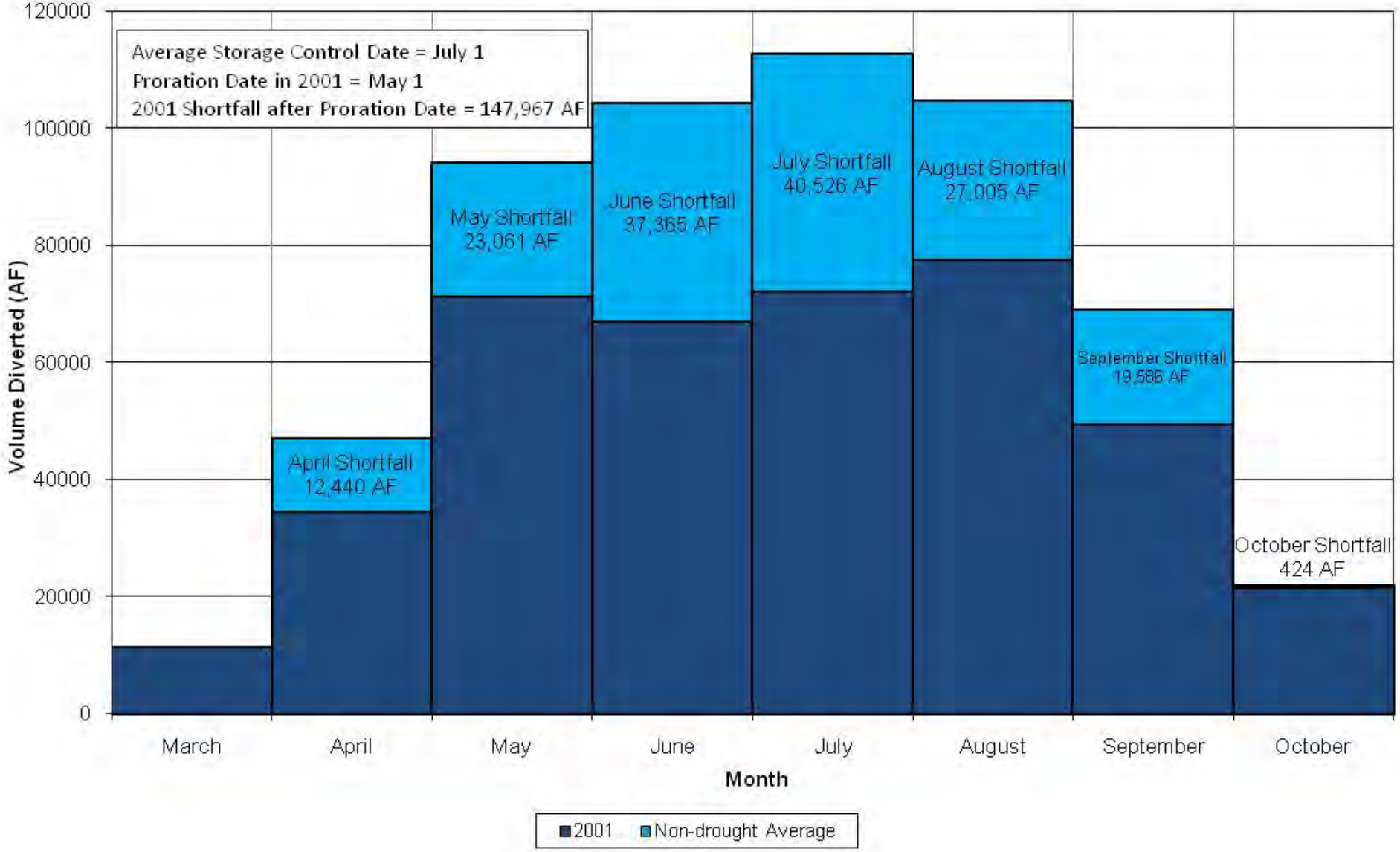
WIP Monthly Diversion Shortfall Comparison
Average Non-Drought Years (1990-2009) vs. Drought Year 2001



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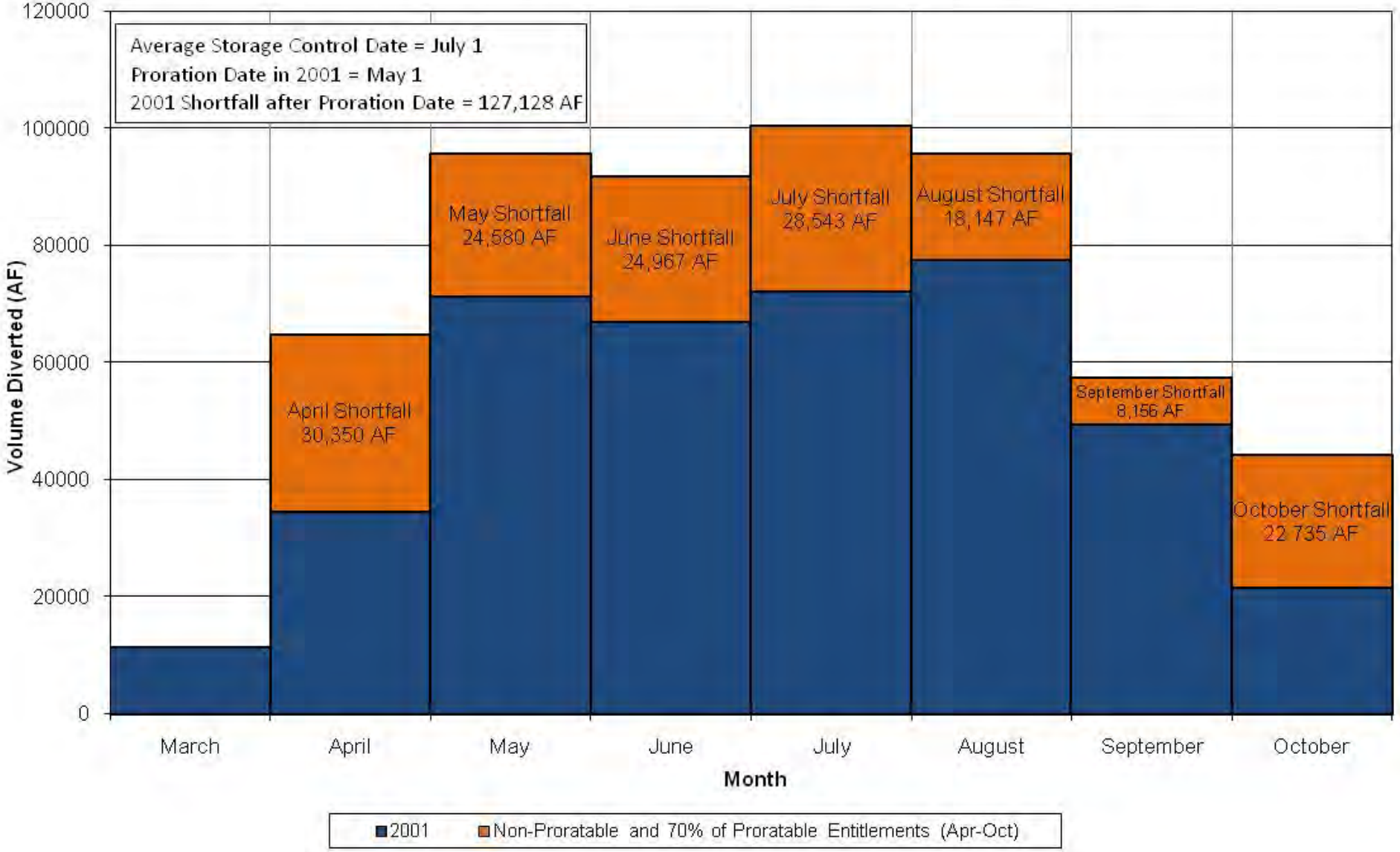
Provisional Results

WIP Monthly Diversion Shortfall Comparison
Non-Proratable and 70 Percent of Proratable Entitlements vs. Drought Year 2001



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Measures of Diversion Shortfalls Adjusted for Proration Date (acre-feet)

	KRD	Roza	WIP
2001 Comparison			
Shortfall between Drought Year 2001 and Average Non-Drought Diversions (1990-2009) Measured after Proration Date of May 1, 2001	155,841	135,557	147,967
Shortfall between Drought Year 2001 and (100% of Non-Proratable Entitlements + 70% of Proratable Entitlements) Measured after Proration Date of May 1, 2001	112,705	102,438	127,128
2005 Comparison			
Shortfall between Drought Year 2005 and Average Non-Drought Diversions (1990-2009) Measured after Proration Date of April 6, 2005	140,815	122,702	131,934
Shortfall between Drought Year 2005 and (100% of Non-Proratable Entitlements + 70% of Proratable Entitlements) Measured after Proration Date of April 6, 2005	95,848	83,155	125,063

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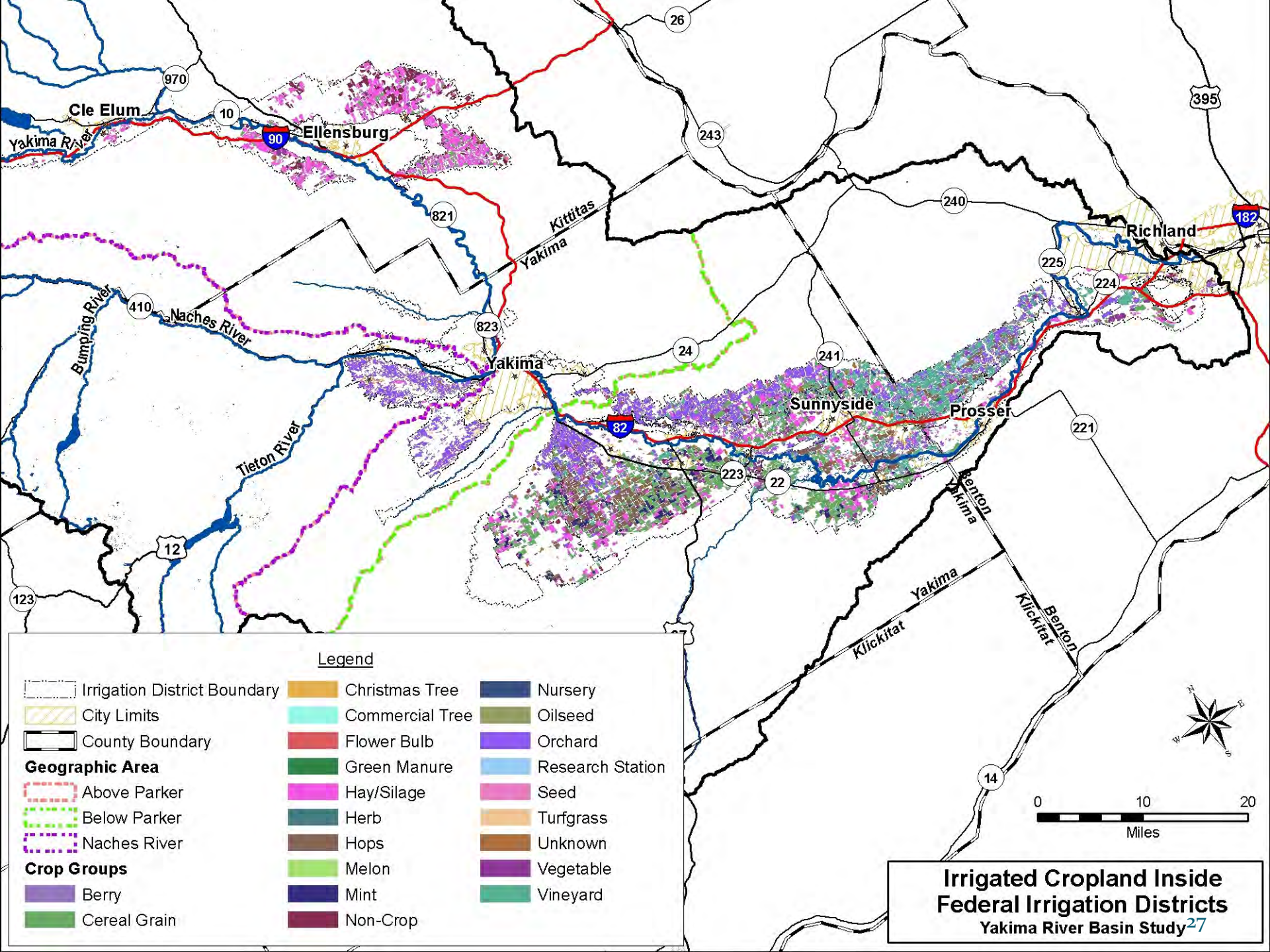
Crop Census

- Previous crop data from Reclamation
- New data from Washington State Dept of Agriculture

Historic Records of Yakima Project Irrigated Crop Production (acres)

Crop	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Corn	14,937	13,941	21,095	18,444	13,995	10,958	8,859	14,124	12,244	13,134	13,489
Grain	52,176	48,846	43,839	35,996	32,726	27,095	26,740	27,951	31,370	19,449	27,417
Forage	136,797	139,242	135,851	146,014	134,833	135,010	134,617	136,769	140,931	139,268	139,390
Beans	7,731	1,225	2,436	2,975	2,413	2,308	2,385	3,226	3,046	2,949	3,834
Hops	28,928	27,024	23,150	21,000	20,324	23,539	23,791	23,237	26,924	28,472	29,500
Mint	15,874	14,106	16,854	18,959	15,258	13,880	15,342	16,492	19,144	19,474	18,664
Vegetables	28,267	27,521	28,587	27,655	27,296	33,045	30,041	27,185	29,818	30,108	24,158
Nursery	895	1,356	1,078	633	698	625	780	964	561	596	629
Seed crops	457	390	262	726	91	471	773	797	485	447	358
Fruits	82,071	91,566	94,080	90,570	95,000	102,231	103,281	100,017	101,146	99,580	102,226
Nuts				5	5	5	5	29	38	38	38
All Crops	**371,096**	**367,669**	**369,113**	**363,870**	**363,870**	**350,752**	**349,931**	**354,111**	**365,809**	**354,470**	**360,675**

Source: Reclamation, YRBWEP Draft Programmatic EIS (April 1998)


Cle Elum
Yakima River
Ellensburg
Kittitas
Yakima
Bumping River
Naches River
Tieton River
Yakima
Sunnyside
Prosser
Richland
Benton
Yakima
Klickitat
Yakima
Klickitat
Benton
26
970
10
90
243
395
821
240
182
225
224
823
24
241
82
223
22
221
12
123
14
Legend
Irrigation District Boundary
City Limits
County Boundary
Geographic Area
Above Parker
Below Parker
Naches River
Crop Groups
Berry
Cereal Grain
Christmas Tree
Commercial Tree
Flower Bulb
Green Manure
Hay/Silage
Herb
Hops
Melon
Mint
Non-Crop
Nursery
Oilseed
Orchard
Research Station
Seed
Turfgrass
Unknown
Vegetable
Vineyard
0
10
20
Miles
Irrigated Cropland Inside
Federal Irrigation Districts
Yakima River Basin Study

Yakima Project Crop Survey Data (acres)

Crop Group	Acreage
Orchard	63,462
Hay/Silage	53,841
Cereal Grain	51,582
Vineyard	36,418
Hops	21,081
Non-Crop	12,857
Vegetable	10,220
Mint	8,858
Unknown	8,058
Nursery	963
Turfgrass	629
Seed	617
Research Station	470
Berry	442
Green Manure	253
Oilseed	244
Melon	98
Herb	51
Commercial Tree	49
Flower Bulb	31
Christmas Tree	7
Grand Total	**270,232**

- 80-90,000 acres not accounted for, some crop types and areas probably not picked up in survey.
- Further crop survey data required to fill in data holes

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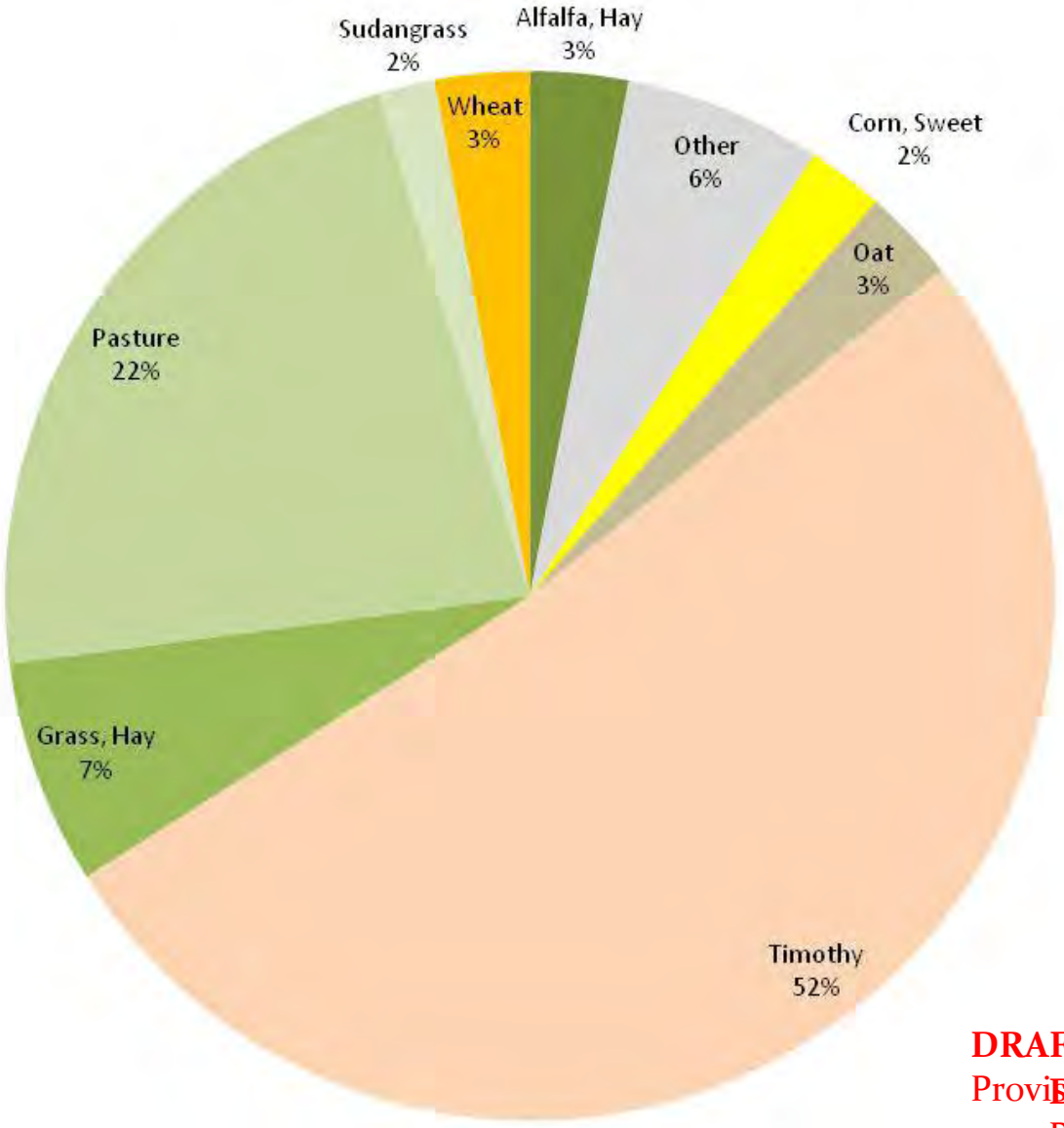
Source: Washington State Department of Agriculture Survey Data (GIS Database)

Estimated Crop Distribution for KRD



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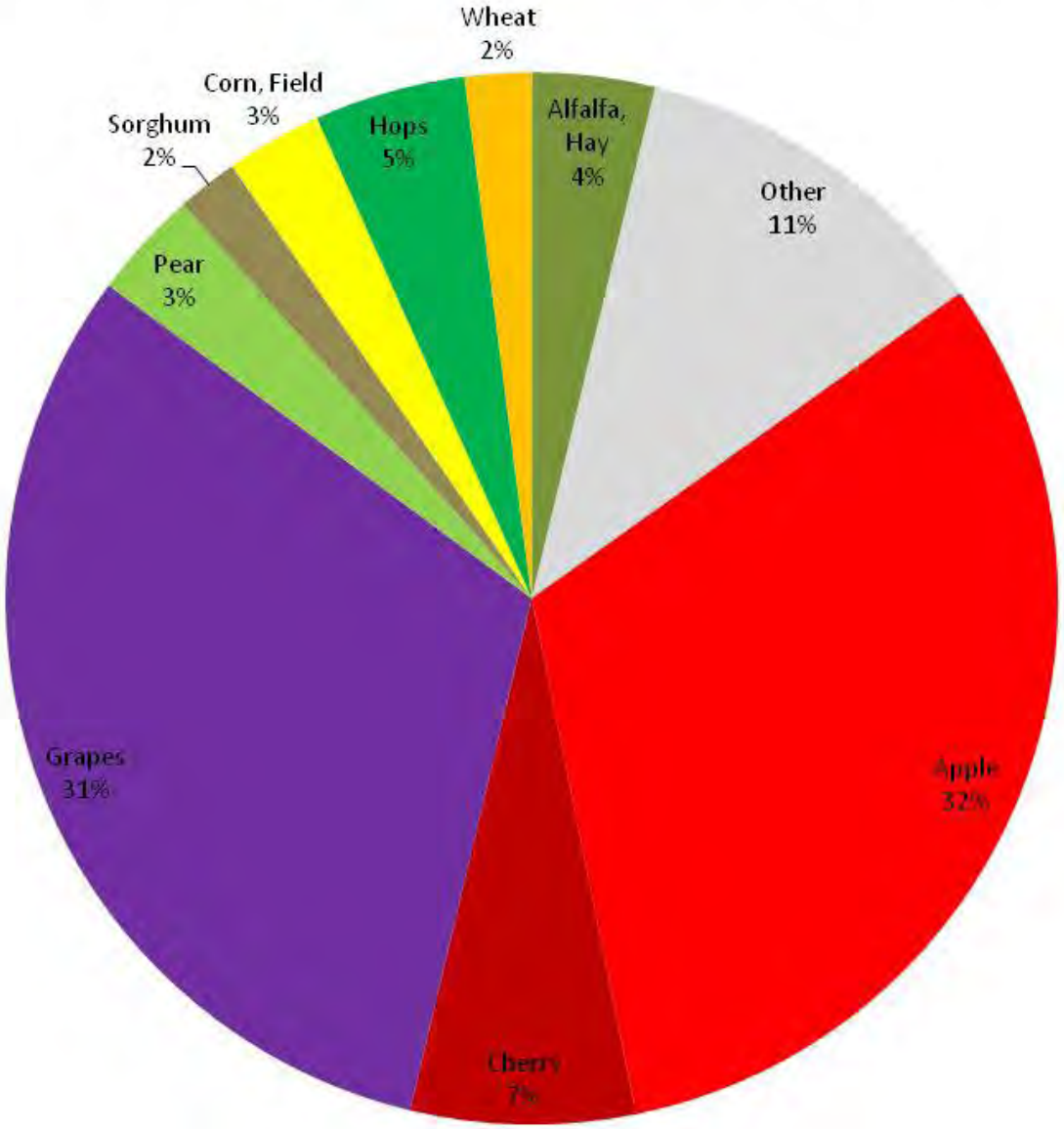
Provisional Results

Source: Washington State Department of Agriculture Survey Data (GIS Database)

Estimated Crop Distribution for Roza Irrigation District



Source: Washington State Department of Agriculture Survey Data (GIS Database)

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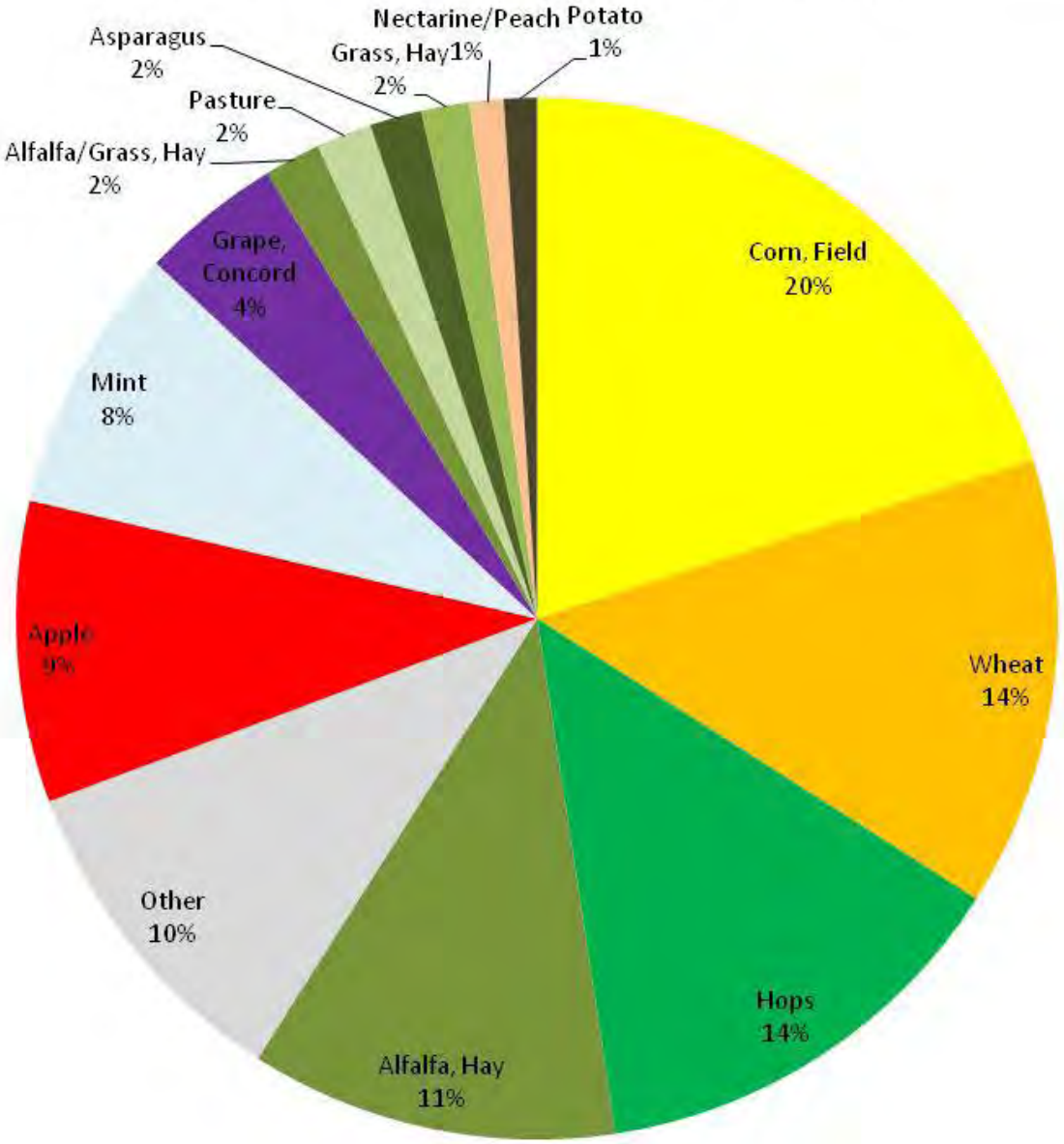
Estimated Crop Distribution for WIP



Source: Washington State Department of Agriculture Survey Data (GIS Database)

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Crop and On-farm Irrigation Needs

- Average Crop Irrigation Requirements (CIR) from Washington Irrigation Guide
  - Use representative stations (Ellensburg, Yakima, Sunnyside, Richland) to estimate average CIR for crops in WSDA census
  - Estimate district-wide average CIR in acre-feet using irrigated acreage from Districts
- WSDA data includes irrigation type
- Use Ecology guidance on irrigation efficiencies to estimate total on-farm water needs, including seepage and evaporative losses

Example Crop Irrigation Requirements
Sunnyside Station

Crop	Total CIR (ft)
Caneberry	3.58
Currant	3.58
Barley	2.05
Corn, Field	2.44
Oat	2.05
Rye	2.05
Triticale	2.05
Wheat	2.03
Green Manure	2.05
Alfalfa, Hay	3.09
Alfalfa/Grass, Hay	3.09
Clover, Hay	3.43
Grass, Hay	3.43
Hay/Silage, Unknown	3.43
Sorghum	2.09

Crop	Total CIR (ft)
Sudangrass	3.43
Timothy	3.43
Hops	2.56
Watermelon	1.26
Mint	3.00
Pasture	2.46
Wildlife Feed	2.44
Apple	3.70
Apricot	3.50
Cherry	3.74
Nectarine/Peach	3.48
Orchard, Unknown	3.70
Pear	3.42
Plum	3.42
Driving Range	3.26

Crop	Total CIR (ft)
Golf Course	3.26
Sod Farm	3.26
Asparagus	2.50
Bean, Dry	1.89
Bean, Green	1.55
Corn, Sweet	1.75
Cucumber	1.83
Market Crops	2.29
Onion	2.77
Potato	2.40
Pumpkin	1.49
Squash	1.49
Tomato	2.29
Vegetable, Unknown	2.29
Grape, Concord	2.28
Grape, Wine	2.28

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Estimated Average Crop Irrigation Requirements by District (acre-feet)

	KRD	Roza	WIP	Sunnyside
Station Used	Ellensburg	Sunnyside	Sunnyside	Sunnyside
Average Crop Irrigation Requirement (ft)	2.51	2.97	2.69	2.72
Estimated Irrigated Area (ac)	55,500	71,700	96,700	99,200

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Yakima Project Irrigation Type by Crop

Irrigation Type	Orchard	Hay/Silage	Cereal Grain	Vineyard	Hops	Non-Crop	Vegetable	Mint	Unknown	Nursery	Turfgrass	Seed	Research Station	Berry	Green Manure	Oilseed	Melon	Herb	Commercial Tree	Flower Bulb	Christmas Tree	Grand Total
Rill	1,200	20,957	29,941	10,726	3,178	5,539	5,471	5,578	1,337	238		337		69	45			11		26		**84,653**
Sprinkler	58,972	3,989	864	13,615	62	1,109	307	274	2,574	456	629	6	148	41	52					5	7	**83,110**
Drip	2,422			11,917	17,697		1,704		152	241			286	332			98		6			**34,853**
Wheel Line	58	17,804	6,749		73	1,244	1,083	2,837	934	8		166	28		18	208						**31,211**
Center Pivot	125	9,467	12,969			906	1,579	115	927			107				36		40				**26,273**
None	503	1,275	680	114	33	973	56	6	1,171				8									**4,819**
Flood		25				2,967																**2,992**
Unknown	183	87	204	46	37	99	22	47	962	14					138				43			**1,882**
Big Gun		237	176			15																**428**
Hand										6												**6**
(blank)						5																**5**
Grand Total	**63,462**	**53,841**	**51,582**	**36,418**	**21,081**	**12,857**	**10,220**	**8,858**	**8,058**	**963**	**629**	**617**	**470**	**442**	**253**	**244**	**98**	**51**	**49**	**31**	**7**	**270,232**

Source: Washington State Department of Agriculture Survey Data (GIS Database)

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Provisional Results

Ecology Guidance for Irrigation Efficiencies

Table 1: Summary of Application Efficiency Ranges, Consumptive Use, and Return Flows[1]

Method		Application Efficiency, Ea (%)[2]		%Total Evaporated	% Total Use Consumed	Return Flow
		Range	Average, Ea_{avg}	%Evap	%CU, Average[3]	%RF, Average[4]
Surface:	Graded Furrow	50 – 80	65	5	70	30
	w/ tailwater reuse	60 – 90	75	5	80	20
	Level Furrow	65 – 95	80	5	85	15
	Graded Border	50 – 80	65	5	70	30
	Level Basins	80 – 95	85	5	90	10
	Flood	35 – 60	50	5	55	45
Sprinkler:	Periodic Move (Handline)	60 – 85	75	10	85	15
	Side Roll (Wheelline)	60 – 85	75	10	85	15
	Moving Big Gun	55 – 75	65	10	75	25
	Solid-Set—Overtree	55 – 80	70	15	85	15
	Solid Set--Undertree	60 – 85	75	10	85	15
	Pop-Up Impact	60 – 85	75	10	85	15
Center-Pivot	Impact heads w/end gun	75 – 90	80	15	95	5
	Spray heads w/o end gun	75 – 95	90	10	100	0
	LEPA[5] w/o end gun	80 – 98	92	5	97	3
Lateral-Move	Spray heads w/hose feed	75 – 95	90	10	100	0
	Spray heads w/canal feed	70 – 95	85	10	95	5
Microirrigation:	Trickle/Drip	70 – 95	88	5	93	7
	Subsurface Drip	75 – 95	90	0	90	10
	Microspray	70 – 95	85	10	95	5

1. Calculate the actual water use from water meter data, power meter, or run-time data. In the absence of such data, the TIR (total irrigation requirement) = CIR / Ea, where CIR is the crop irrigation requirement from the WIG (Appendix B) and Ea is the case-specific application efficiency above.
2. %Evap is the portion of the total irrigation requirement that is evaporated due to factors other than crop ET.
3. Select appropriate %CU based on type of irrigation system. If calculated Ea is greater or less than Ea_{avg}, then %CU = Ea + %Evap. CU = TIR x %CU.
4. Select appropriate %RF based on type of irrigation system. If calculated Ea is greater or less than Ea_{avg}, then %RF = 100 - %CU. RF = TIR x %RF
5. Low Energy Precision Application.

Estimated Total On-Farm Irrigation Needs (acre-feet/acre)

	KRD	Roza	WIP	Sunnyside
Station Used	Ellensburg	Sunnyside	Sunnyside	Sunnyside
Average Crop Irrigation Requirement	2.51	2.97	2.69	2.72
Average On-Farm Application Loss (Seepage Loss)	1.03	0.55	0.71	0.68
Average On-Farm Evaporation Loss	0.23	0.34	0.28	0.30
Estimated Total On-Farm Delivery Needs	**3.77**	**3.86**	**3.67**	**3.70**

Note: Sunnyside Estimated Total On-Farm Delivery Need of 3.7 acre-feet/acre calculated with this methodology is close to the value provided by the District (3.8 acre-feet/acre).

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Estimated Total On-Farm Water Needs (acre-feet)

	KRD	Roza	WIP
Estimated Irrigated Acreage (ac)	55,500	71,700	96,700
Average Crop Irrigation Requirement	139,100	213,200	259,700
Average On-Farm Application Loss (Seepage Loss)	57,400	39,200	68,500
Average On-Farm Evaporation Loss	12,700	24,600	26,700
Estimated Total On-Farm Water Needs	**209,200**	**277,000**	**355,000**

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Provisional Results

Comparison between On-Farm Water Needs and Drought Year Diversions (acre-feet)

	KRD	Roza	WIP
Drought Year 2001 Diversions	122,780	166,690	404,645
Drought Year 2005 Diversions	144,662	192,573	428,080
Estimated Total On-Farm Delivery Needs	209,200	277,000	355,000

Note: Does not account for conveyance losses in delivery canals

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Return Flow

- Seepage and spill from canals and farms returns to the Yakima River and contributes to instream flow and to water supplies in downstream reaches
- Irrigated Acreage contributing return flows:

Area	Estimated Irrigated Acreage Using WSDA Data
Kittitas Valley	70,500
Yakima/Naches Valley above Parker	54,200
Lower Yakima Valley	311,400
Total Irrigated Acreage	436,100

Note: Estimate of total irrigated acreage is low as previous estimate was 506,700 acres

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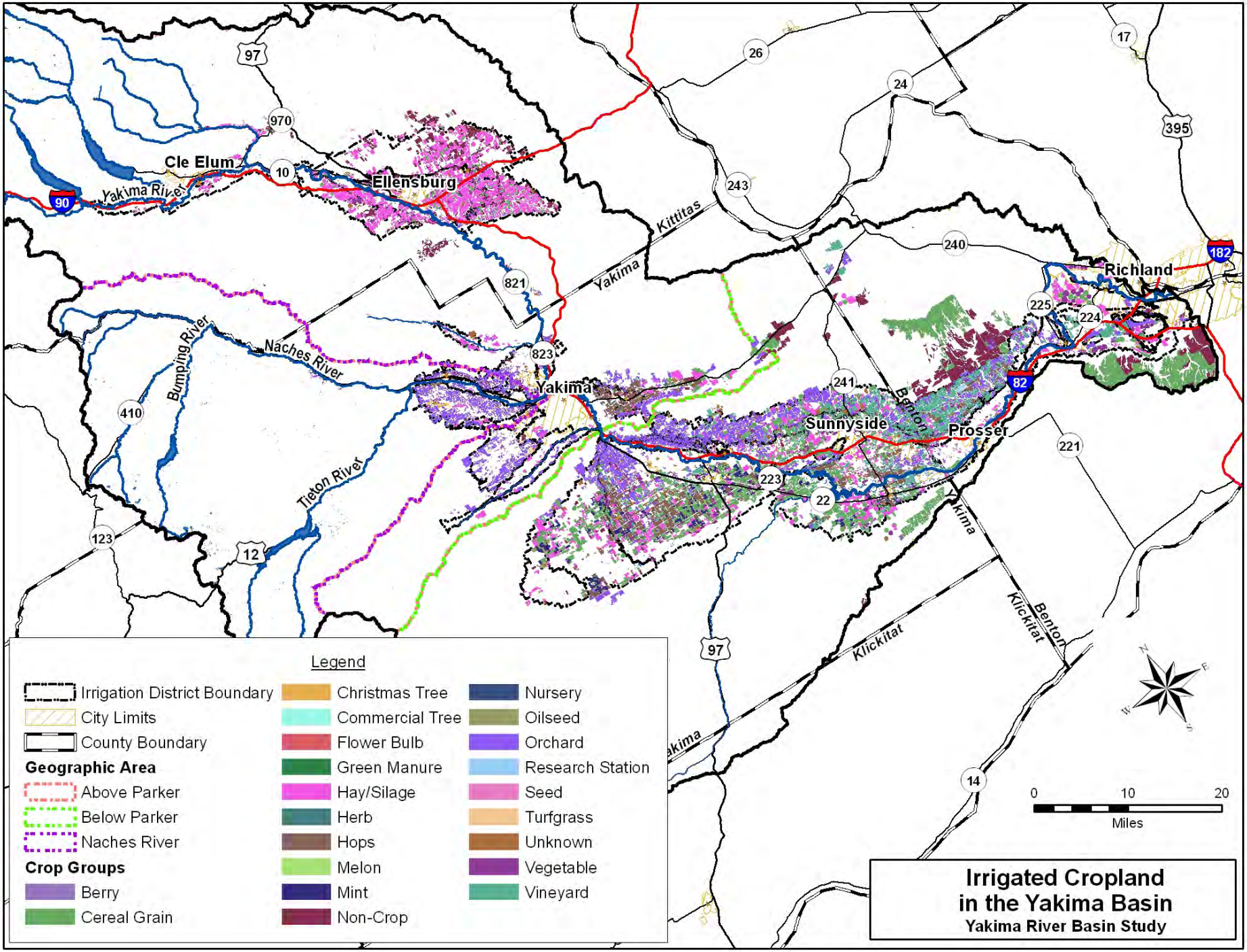
Provisional Results


Cle Elum
Ellensburg
Yakima River
Kittitas
Yakima
Richland
Bumping River
Naches River
Yakima
Sunnyside
Prosser
Benton
Tieton River
Klickitat
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Benton
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Miles
Legend
Irrigation District Boundary
City Limits
County Boundary
Geographic Area
Above Parker
Below Parker
Naches River
Crop Groups
Berry
Cereal Grain
Christmas Tree
Commercial Tree
Flower Bulb
Green Manure
Hay/Silage
Herb
Hops
Melon
Mint
Non-Crop
Nursery
Oilseed
Orchard
Research Station
Seed
Turfgrass
Unknown
Vegetable
Vineyard
Irrigated Cropland
in the Yakima Basin
Yakima River Basin Study

Projected Monthly Usable Return Flow (ac-ft) for TWSA Development (Above Parker)

Month	Low Runoff Year*	Average Runoff Year	High Runoff Year
April	42,000	42,000	42,000
May	58,000	64,000	70,000
June	64,000	66,000	66,000
July	76,000	78,000	82,000
August	71,000	73,000	75,000
September	39,000	52,000	65,000
October	16,000	21,000	26,000
Total	**366,000**	**396,000**	**426,000**

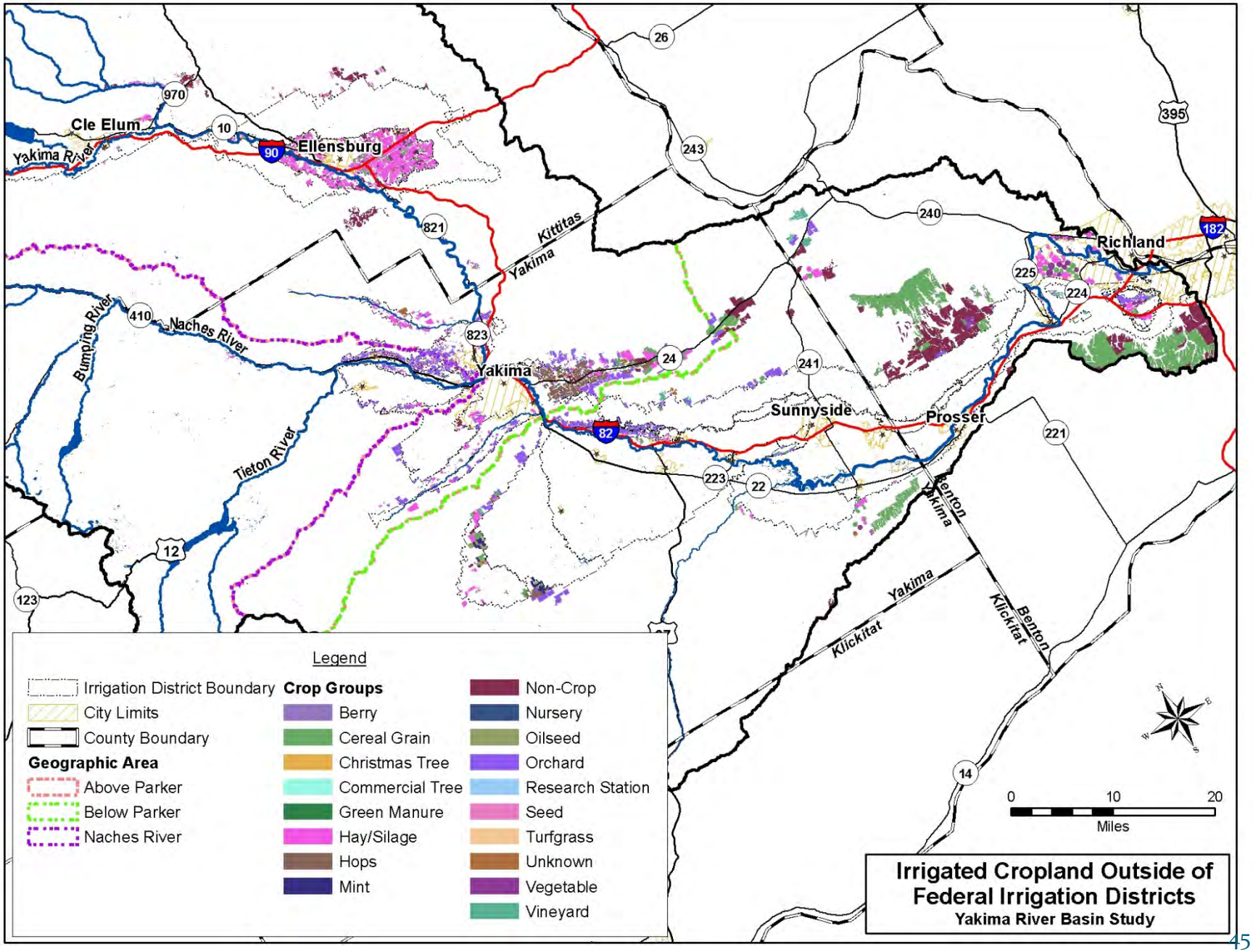
Source: Reclamation, IOP (November, 2002)

*Does not include drought years (1992, 1993, 1994, 2001, 2005)

Next Steps

- Talk to Districts to obtain additional data on crops, coping strategies during droughts and overall needs
- Complete Irrigation District crop data analysis
- Analyze agricultural water conservation projects
  - Conveyance systems
  - On-farm opportunities
- Complete Return Flow Analysis
- RiverWare Modeling

Non-Federal Supplies: Agricultural Needs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Research Station
Seed
Turfgrass
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Vegetable
Vineyard
0
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20
Miles
Irrigated Cropland Outside of Federal Irrigation Districts
Yakima River Basin Study

Non-Federal Category In Progress at This Time

- Have analyzed State database of crop patterns
- Have done initial runs to estimate diversions
- Some missing data – working to resolve

Municipal and Domestic Water Uses

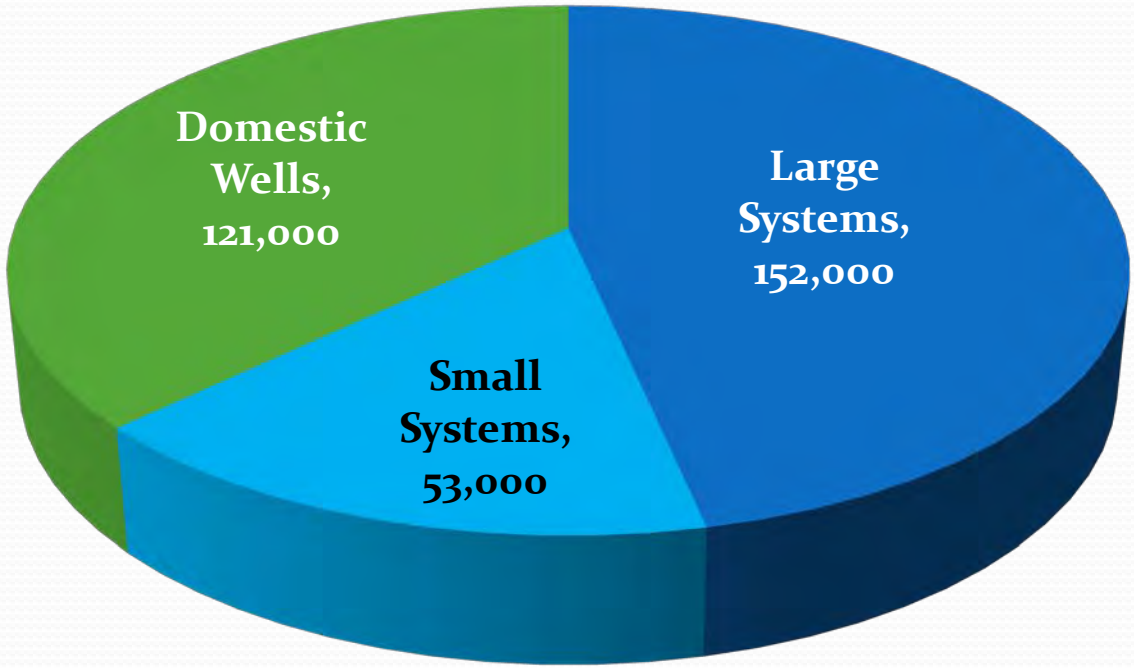
Approach for Municipal & Domestic Uses

1. Document current use for large systems
2. Estimate uses by small systems and domestic wells
3. Account for return flows and seasonality
4. Forecast future changes in demand:
    - Population growth
    - Land conversion
    - Climate change
    - Water conservation

Sources of Information

- Water Systems serving six largest cities:
  - Yakima (City, Nob Hill, Terrace Heights)
  - Ellensburg, Sunnyside, Grandview, Toppenish, Prosser
- Counties – population estimates & forecasts
- State Department of Health – small systems data
- USGS – Ground Water Pumpage Report (2009)

Population by Type of Water Service (2010 Estimates - Draft)



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Population by County and Type of Water Service (2010 Estimates)

County/Category	Pop. Served (2010)
Benton Co. (w/in Basin)	
Large Public Systems	5,110
Small Systems	8,436
Domestic Wells	12,753
Benton Co. Total	***26,299***
Kittitas Co.	
Large Public Systems	17,230
Small Systems	7,869
Domestic Wells	18,802
Kittitas Co. Total	***43,901***
Yakima Co.	
Large Public Systems	129,193
Small Systems	37,106
Domestic Wells	89,290
Yakima Co. Total	***255,589***
Total Basin Population	**325,789**

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Population Forecasts (Medium Curve)

	2010	2030	2060
Yakima County	256,000	343,000	462,000
Kittitas County	44,000	56,000	75,000
Benton Co. (w/in Basin)	26,000	39,000	53,000
Total	**326,000**	**438,000**	**590,000**
Cities	198,000	265,000	357,000
Unincorporated	128,000	173,000	233,000
Total:	**326,000**	**438,000**	**590,000**

Based on County forecasts to 2025; then 1% annual growth to 2060.
(Does not consider water availability as a constraint).

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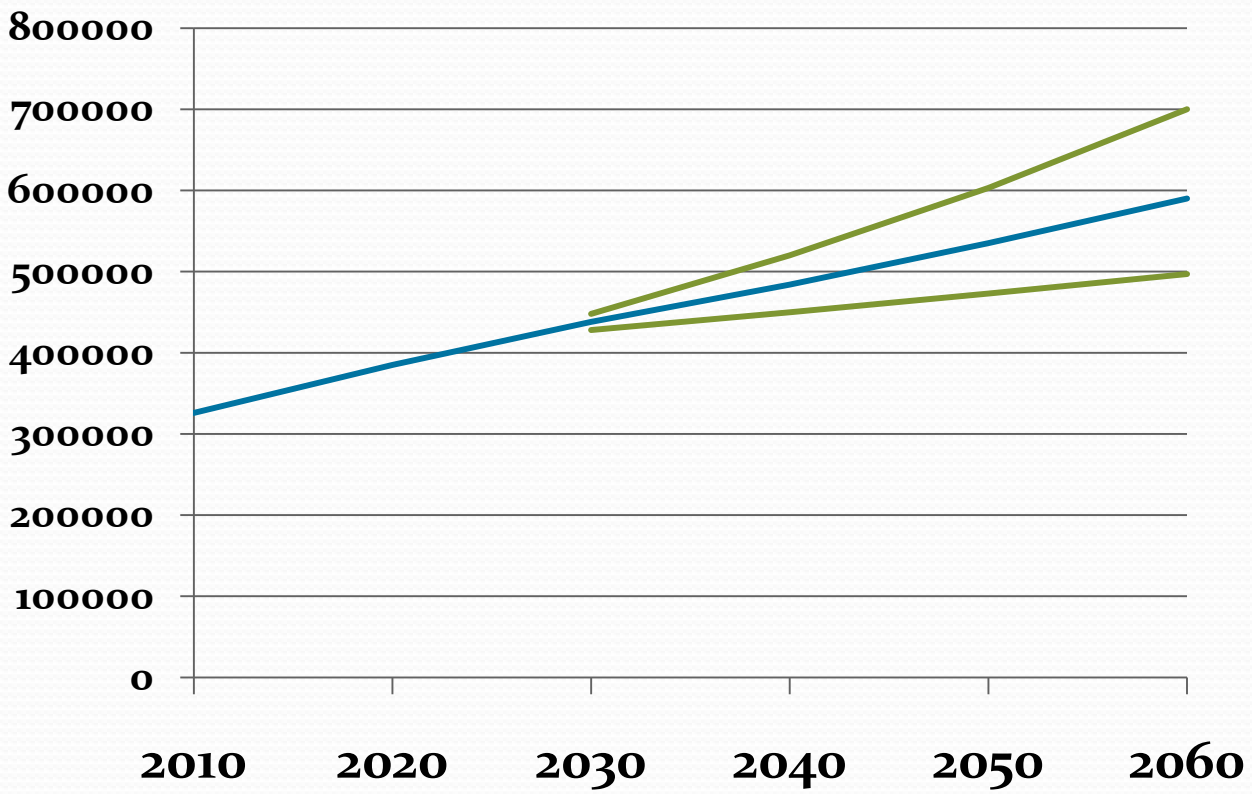
Population with Alternate Growth Rates After 2025



Growth to 2025 based on County projections; then annual growth rates of: Low 0.5%; Medium 1.0%; High 1.5%.

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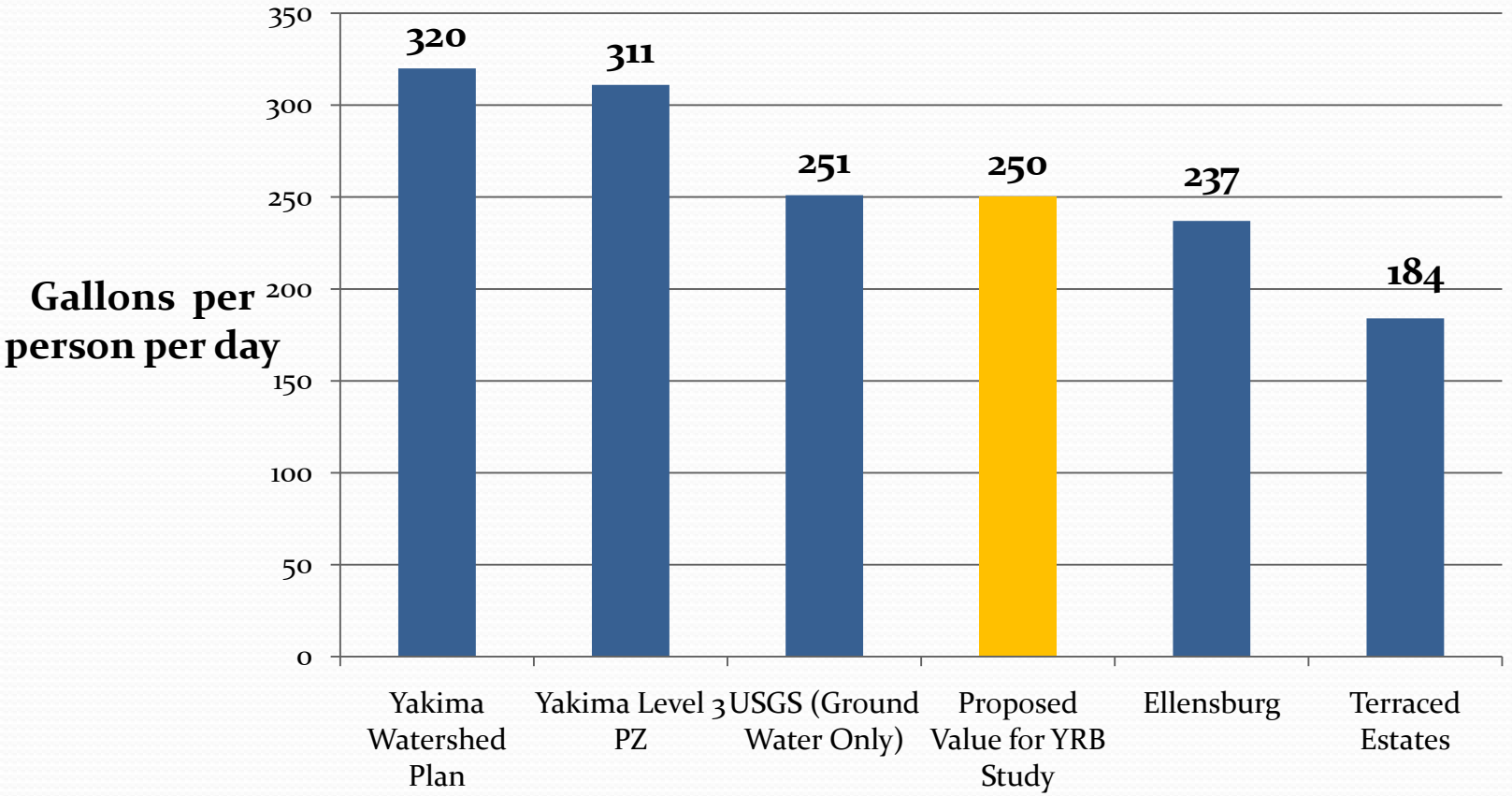
Caveat on Population Growth

- Comparison with recent 20-year intervals:
- 1970 – 1990: **35%** increase
- 1980 – 2000: **19%** increase
- 1990 – 2010: **18%** increase
- 2010 – 2030: **34%** increase

- Next step: follow up discussion with County planning departments

Per Capita Use - Municipal and Domestic Supplies, Yakima Basin



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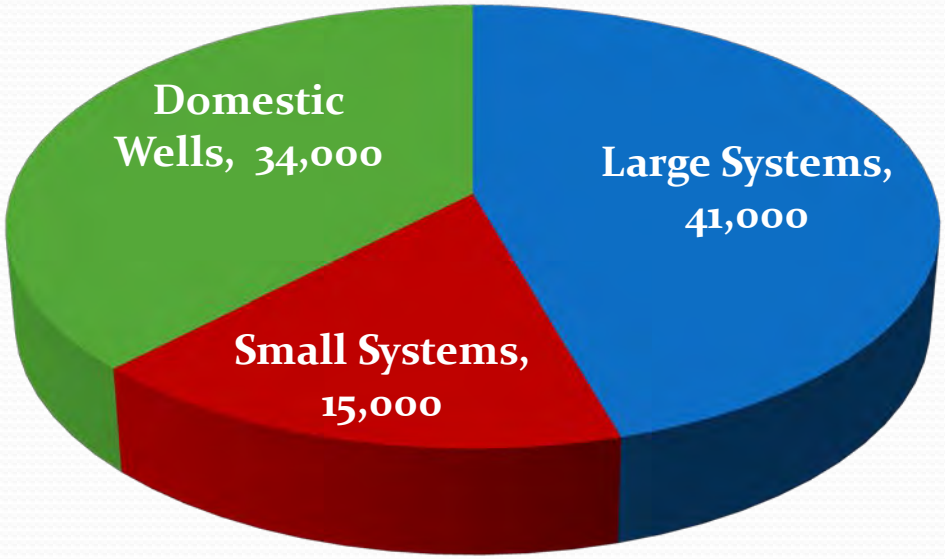
Estimated Municipal/Domestic Water Uses (Acre-Feet per Year -- 2010)



Total Estimated Use: 90,000 Acre-Feet

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Growth-Adjusted Municipal/Domestic Use – Static Conditions (AFY, Medium Forecast)

	2010	2030	2060	2010-2060 Change
Large Systems	41,000	55,000	74,000	33,000
Small Systems	15,000	20,000	27,000	12,000
Domestic Wells	34,000	45,000	60,000	26,000
Total	90,000	120,000	161,000	**71,000**

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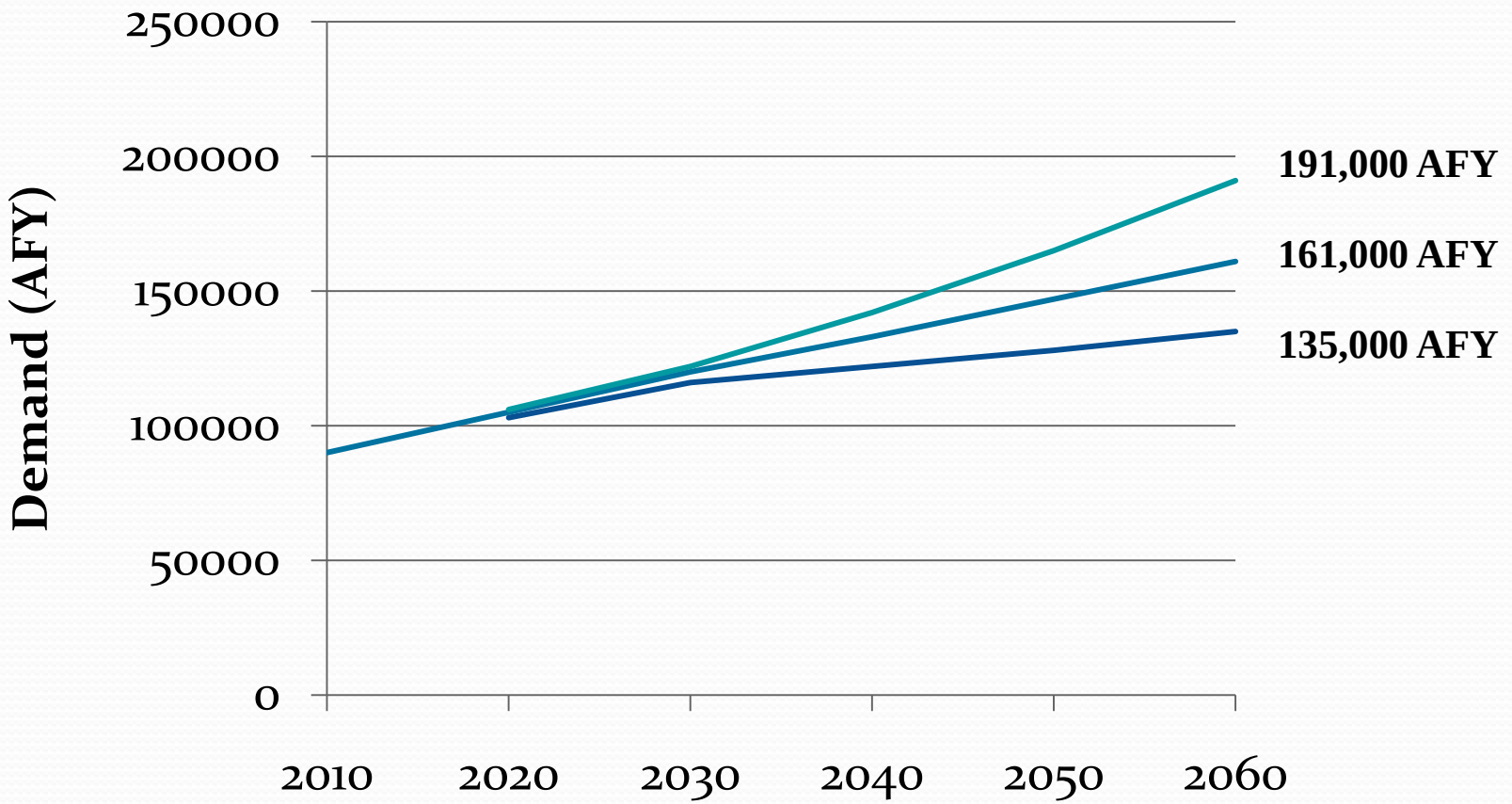
Range of Demands from Growth



Preliminary Estimate of Water Need: Municipal & Domestic

Net Irrigation Season Requirement – Using Medium Forecast (AFY)

	2010	2030	2060	2010-2060 Change
Growth-Based Demand	90,000	120,000	161,000	71,000
Less Supply Already Available	10,000	10,000	10,000	
Less Return Flow (estimated)	45,000	60,000	80,500	
Net Consumptive Use	35,000	50,000	70,500	35,500
Less Off-Season Consumptive Use	11,200	16,000	22,560	
Irrigation Season Consumptive use	23,800	34,000	47,940	**24,140**
Quantity Below Parker				7,155
Quantity Above Parker				**16,985**

(Irrigation season consumptive use can be reduced further with conservation actions)

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Water Conservation: Current Conditions

- Plumbing code: efficiency standards for some indoor fixtures
- State law requires municipal systems to:
  - Set water-use efficiency goals,
  - Plan for conservation
  - Report annually
  - Limit system leakage to 10% of total water produced
- No requirements for domestic well users

"Sideboards" for Considering 50-Year Conservation Effects

- **No-Action Scenario (low end)**
  - Technology and trends increase efficiency
  - Some reduction in system losses
  - Programs inconsistent across basin and don't include domestic wells

- **Comprehensive Scenario (high end)**
  - Technology and trends increase efficiency
  - Higher reduction in system losses
  - Assume more stringent State plumbing code
  - Communities promote conservation extensively
  - Programs are consistent and include domestic wells

Conservation Scenarios: Households Participating

	Current	2060 No-Action	2060 Comprehensive
Efficient clotheswashers	5%	75%	90%
Efficient showerheads	5%	25%	90%
High-efficiency toilets	1%	25%	90%
Irrigation controllers (automatic systems)	0%	25%	90%
Outdoor kits	5%	15%	90%
Decrease faucet use	5%	5%	50%
Decrease shower use	5%	5%	50%
Decrease flushes	1%	1%	50%
Lawn replacement	5%	5%	50%

Conservation Sideboards at 2060

	No-Action Scenario	Comprehensive Scenario	IWRMP Recommended Program
Percent Savings	5%	22%	?
AFY Savings (Gross)	9,000 AFY	35,000 AFY	?
Net Effect (consumptive use, irrigation season)	3,000 AFY	12,000 AFY	?

Using medium municipal/domestic use forecast at 2060: 161,000 AFY

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Next Steps for Municipal and Domestic Uses

- Further checking of preliminary results
- Further communication with County planning departments
- Calculate offsetting reductions from conversion of crop lands
- Estimate effects of climate change on outdoor uses.

Other Uses

Other Uses

Use	AFY
Fish & Wildlife (GW)	9,000
Commercial/Industrial (GW)	7,000
Livestock (GW)	7,000
Non-Community Public Water Systems	3,000
Fish & Wildlife (SW)	TBD
Hydropower (SW)	TBD
Livestock (SW)	TBD

GW = ground water; SW = surface water
Ground water data from USGS (SIR 2006-5205 , April 2009).

Questions/Discussion