Conservation of surface and ground water in a Western watershed experiencing rapid loss of irrigated agricultural land to development

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Outline

- Project objectives
- Accomplishments since March 2010
- Water supply and budget
- Plans for the next year

Project Objectives

1. Model ground and surface water flow under historic, current and future land and water use scenarios
2. Identify socioeconomic factors that determine water use on formerly irrigated land that has been developed and on irrigated land in proximity to development
3. Provide information on hydrology and water use to decision-makers and stakeholders
4. Develop strategies to increase water availability for agriculture while enhancing ecological benefits in key stream reaches
5. Train an interdisciplinary team of graduate students

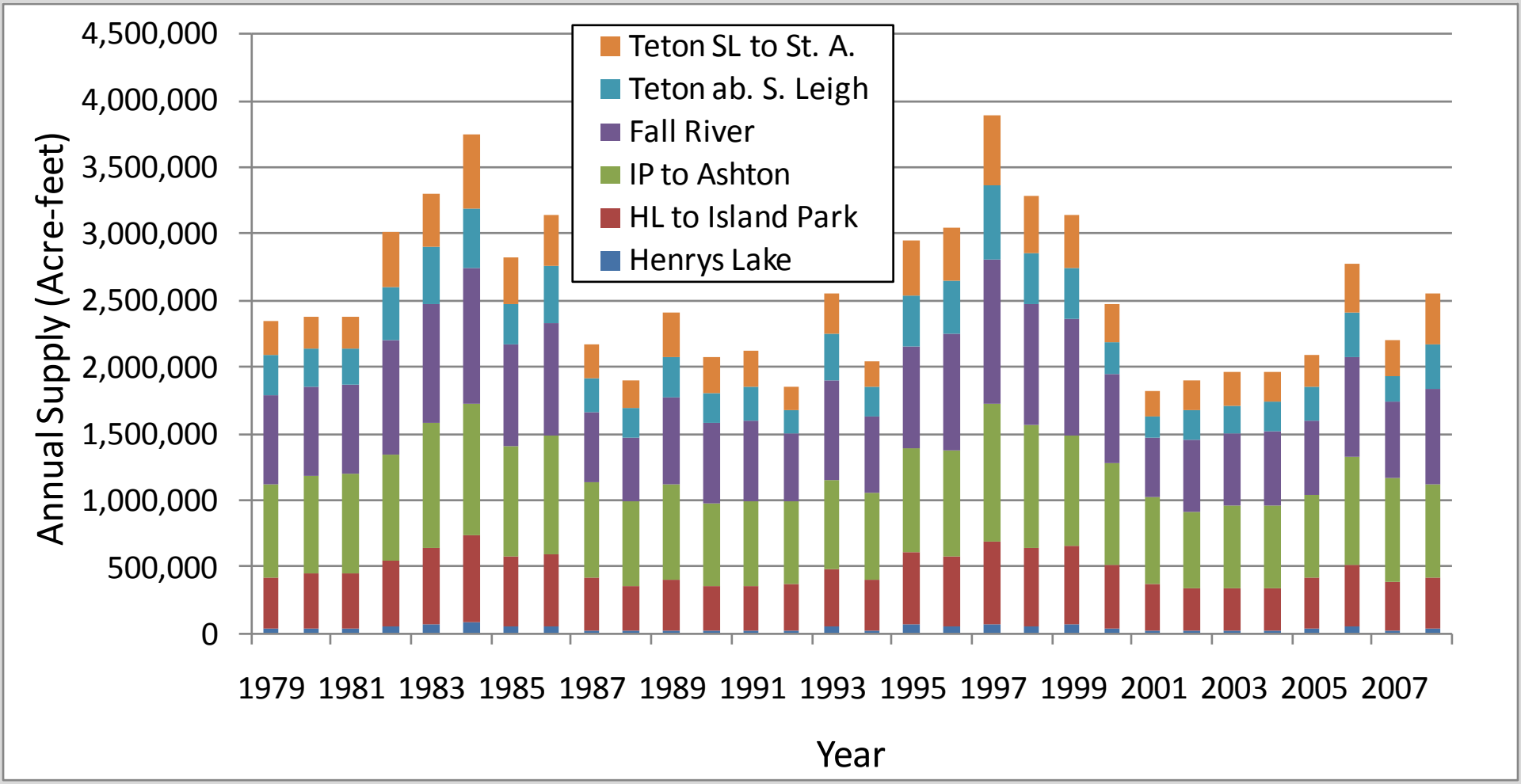
Accomplishments since March 2010

- Conducted formal stakeholder interviews
- Completed GIS analysis of subdivisions on irrigated lands
- Validated/calibrated model components measured from maps
- Held Watershed Council field trip
- Completed canal model
- Completed water supply and budget calculations for USBR
- Gave several presentations around region

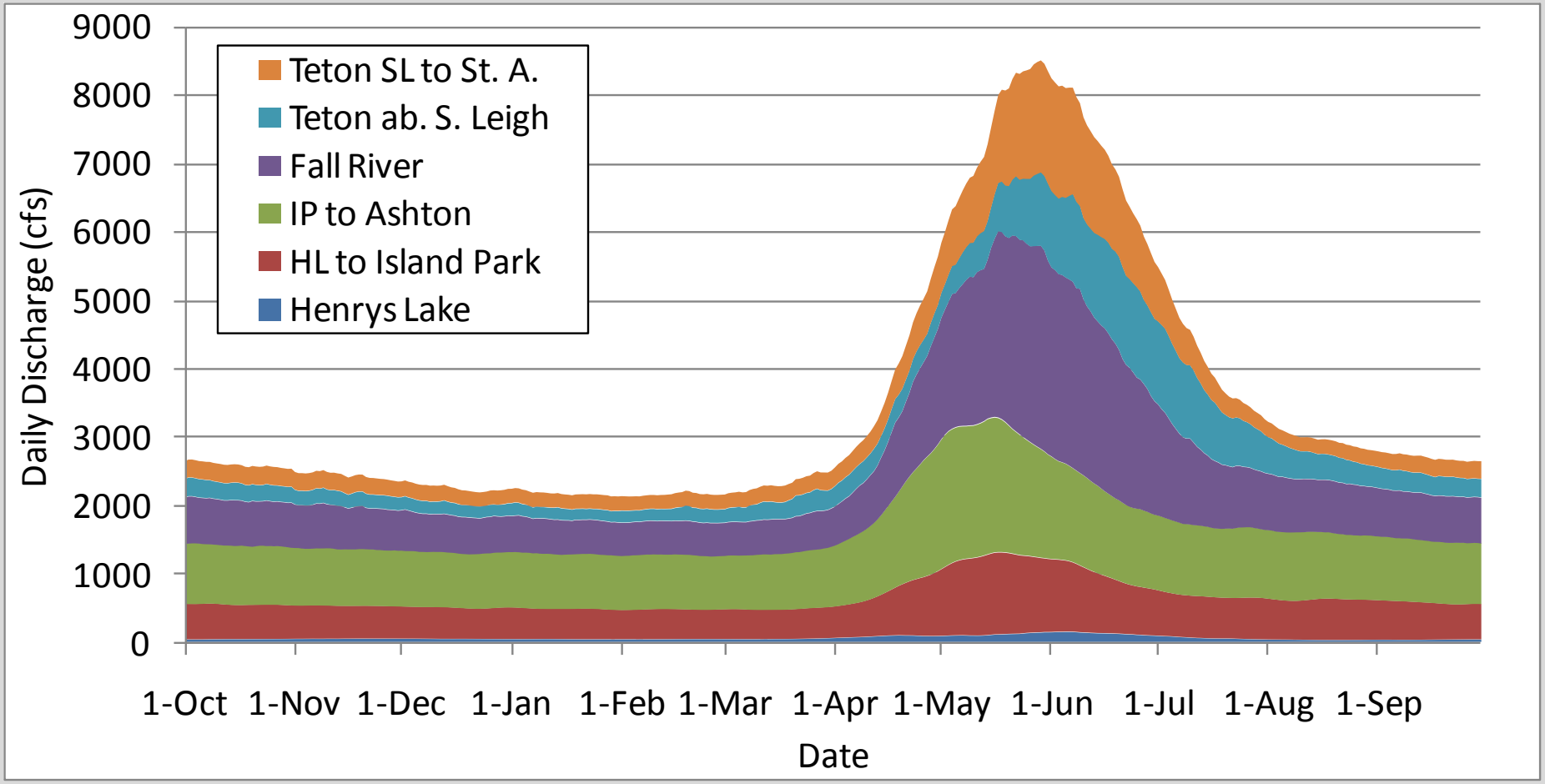
Water Supply Summary

Source	30-year mean annual natural flow (a-f)	% of TOTAL
Henry's Lake	41,768	1.6%
HL to Island Park	439,072	17.3%
Island Park to Ashton	744,516	29.3%
UPPER HF TOTAL	**1,225,356**	**48.2%**
FALL RIVER TOTAL	**699,914**	**27.5%**
Teton ab. S. Leigh	304,084	12.0%
Teton S. Leigh to St. Anth.	314,779	12.4%
TETON RIVER TOTAL	**618,863**	**24.3%**
TOTAL	2,544,133	100.0%

Water Supply by Year

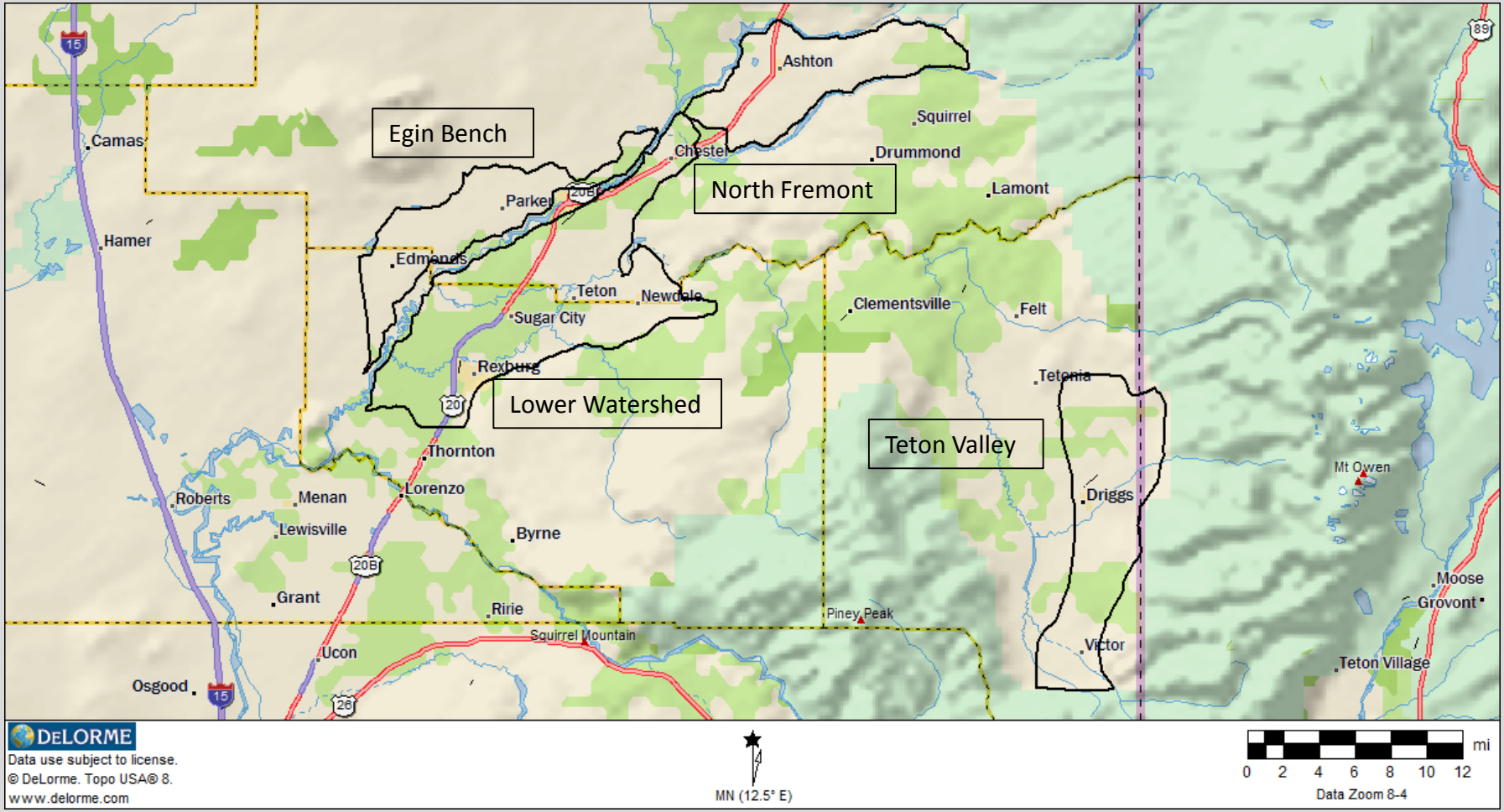


30-year Mean Water Supply Hydrograph



Canal System Water Budget

- Canal system supplies majority of irrigation water to four regions



Summary of the four canal-irrigated regions

Region	Irr. Area acres	Can. Lngth. miles	Diversion acre-ft	Notes
Egin Bench	30,500	111	368,351	Includes Dewey Canal
Lower Watershed	73,000	222	641,724	Includes Crosscut
North Fremont	32,500	51	41,681	North of Fall R.
Teton Valley	45,000	80	81,161	East of Teton R.
TOTAL	181,000	463	1,132,917	

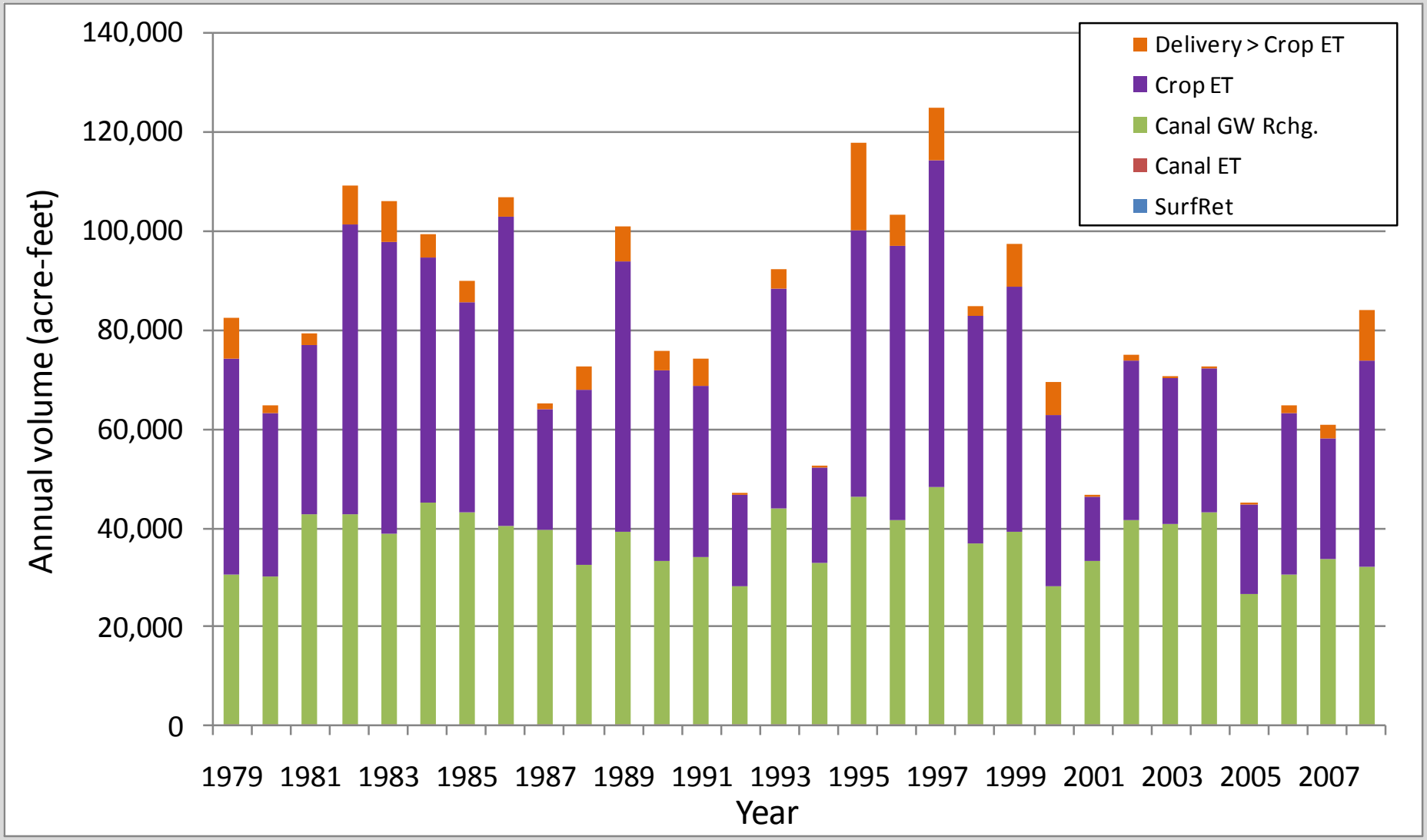
Canal Water Budget Summary

Region	Irr. Area acres	Diversion acre-ft	Surf. Return acre-ft	Canal ET acre-ft	Can. Seep. acre-ft	Delivery acre-ft
Egin Bench	30,500	368,351	11,588	1,298	176,232	179,235
Lower Watershed	73,000	641,724	53,007	1,705	218,322	368,689
North Fremont	32,500	41,681	575	261	22,578	18,268
Teton Valley	45,000	81,161	0	384	37,001	43,776
TOTAL	181,000	1,132,917	65,169	3,649	454,132	609,968
Fraction of diversion		100.0%	5.8%	0.3%	40.1%	53.8%

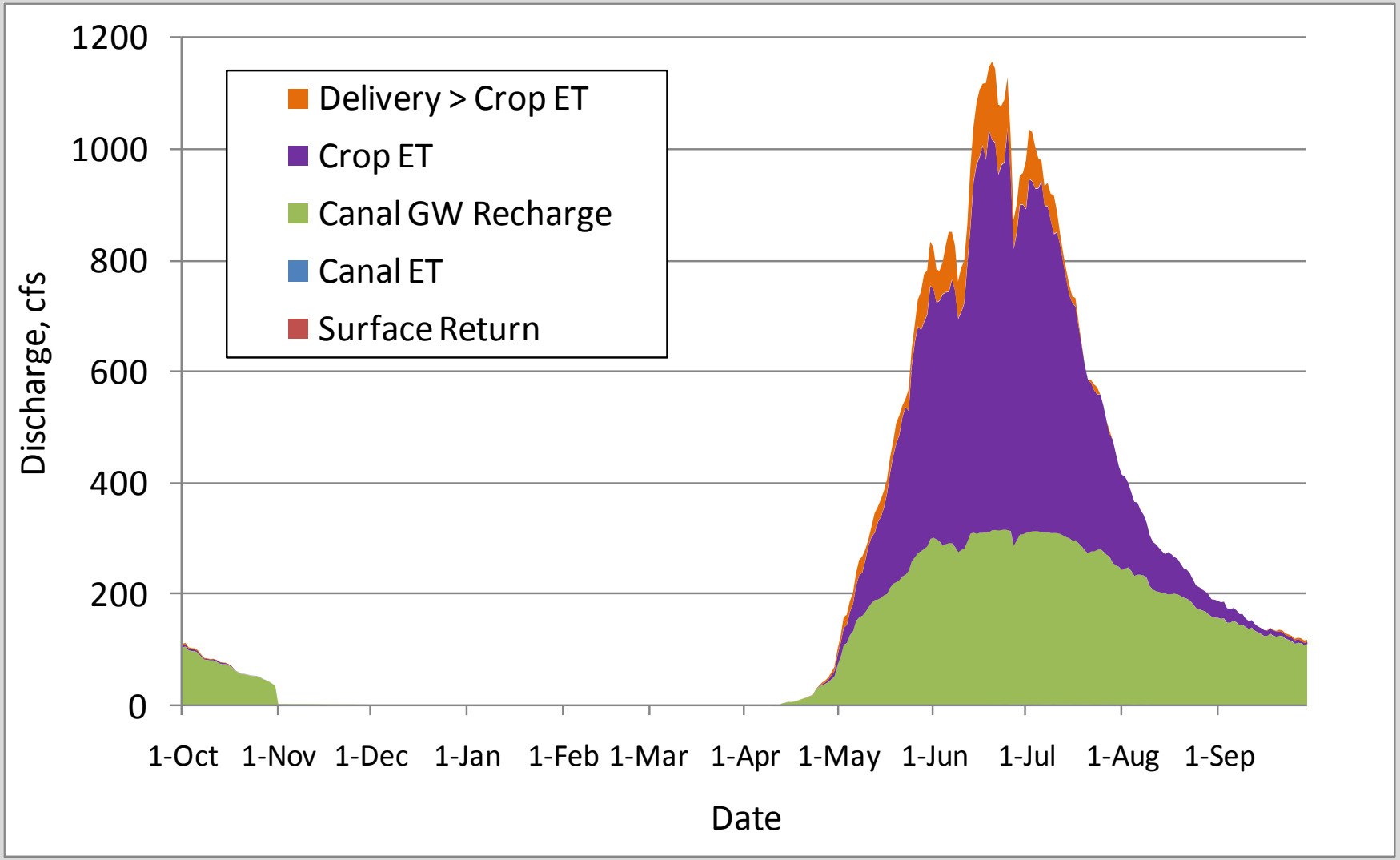
Canal Delivery and Crop ET

Region	Irr. Area acres	Crop Demand acre-ft	Applied ET acre-ft	Delivery > ET acre-ft	% Demand met by irr.	App. ET ft
Egin Bench	30,500	68,670	68,120	111,115	99.2%	2.23
Lower Watershed	73,000	163,123	158,053	210,636	96.9%	2.17
North Fremont	32,500	76,267	17,938	330	23.5%	0.55
Teton Valley	45,000	106,596	39,222	4,554	36.8%	0.87
TOTAL	181,000	414,657	283,333	326,635	86.7%	1.57
Fraction of delivery			46.5%	53.5%		

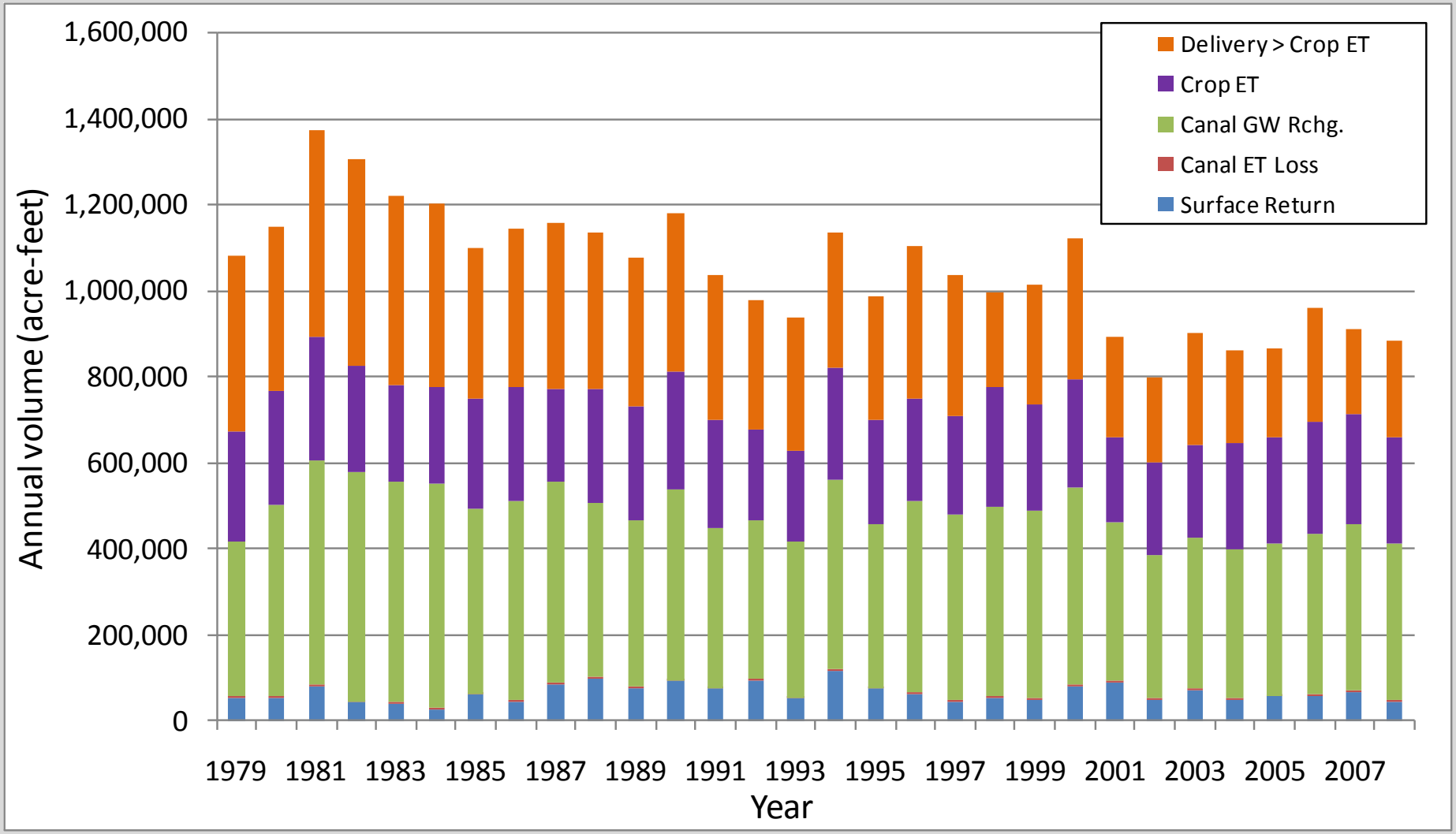
Canal Budget by Year—Teton Valley



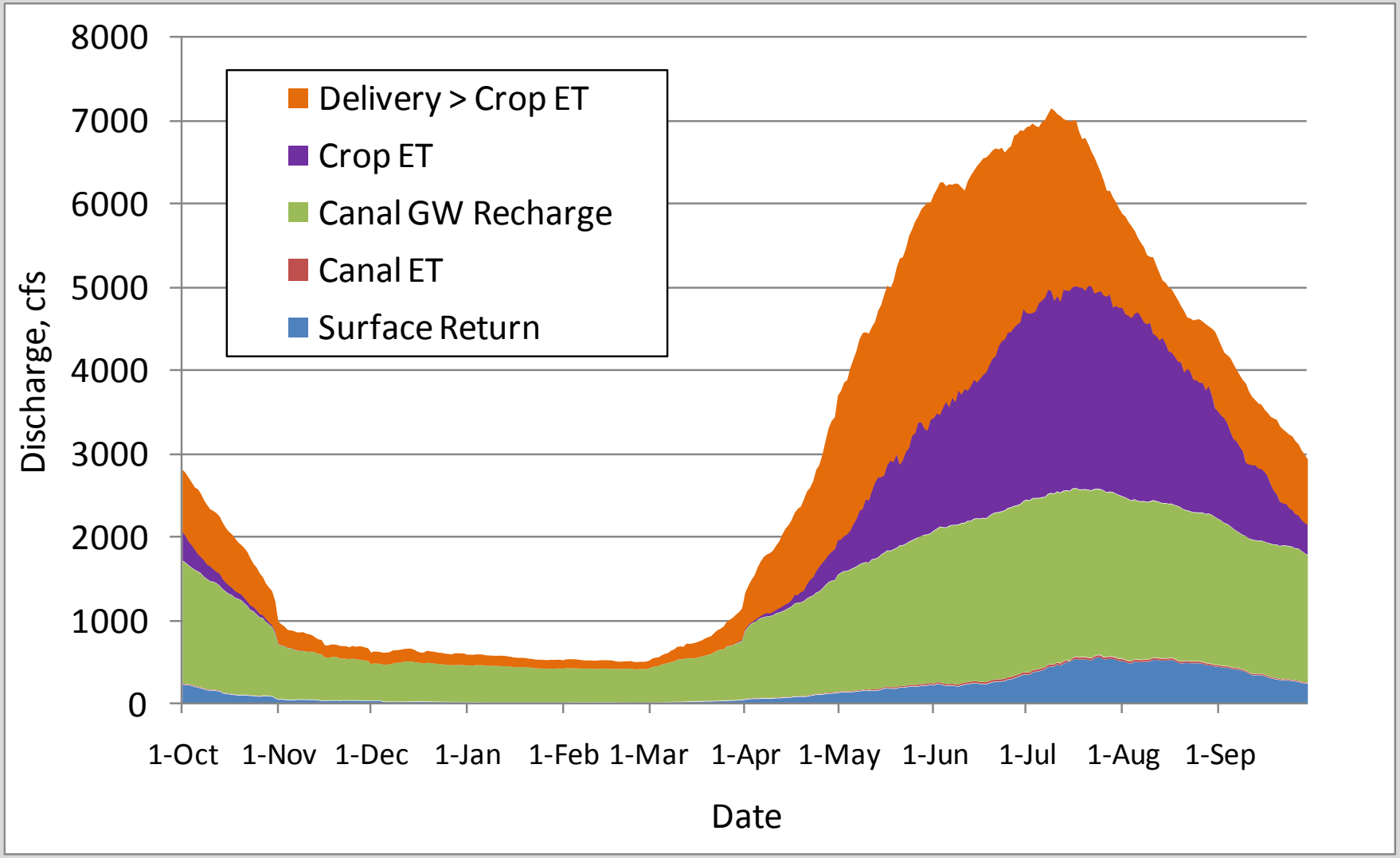
30-year Mean Canal Hydrograph—Teton Valley



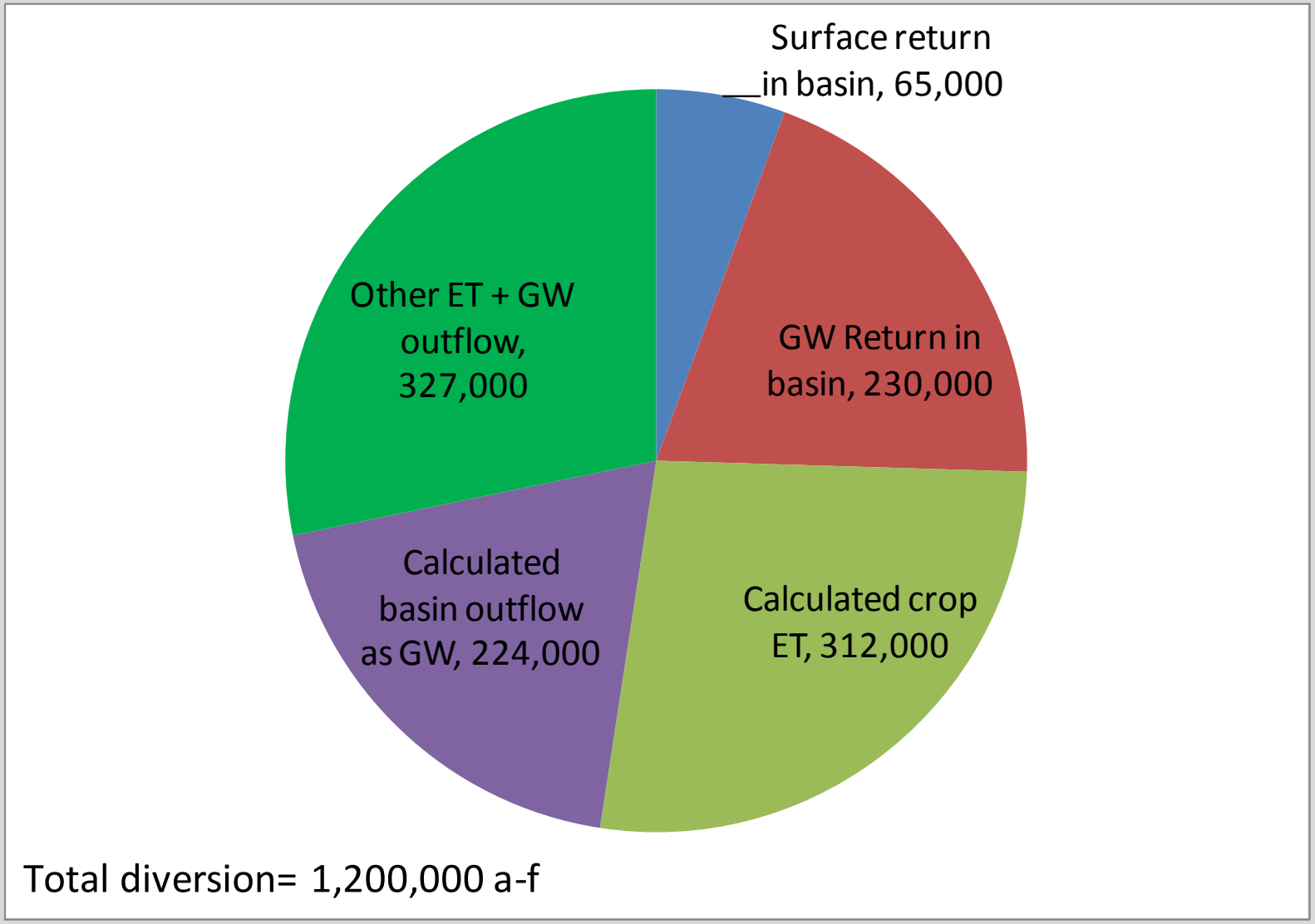
Canal Budget by Year—HF/Fall/Lower Teton



30-year Mean Hydrograph—HF/Fall/Lower Teton



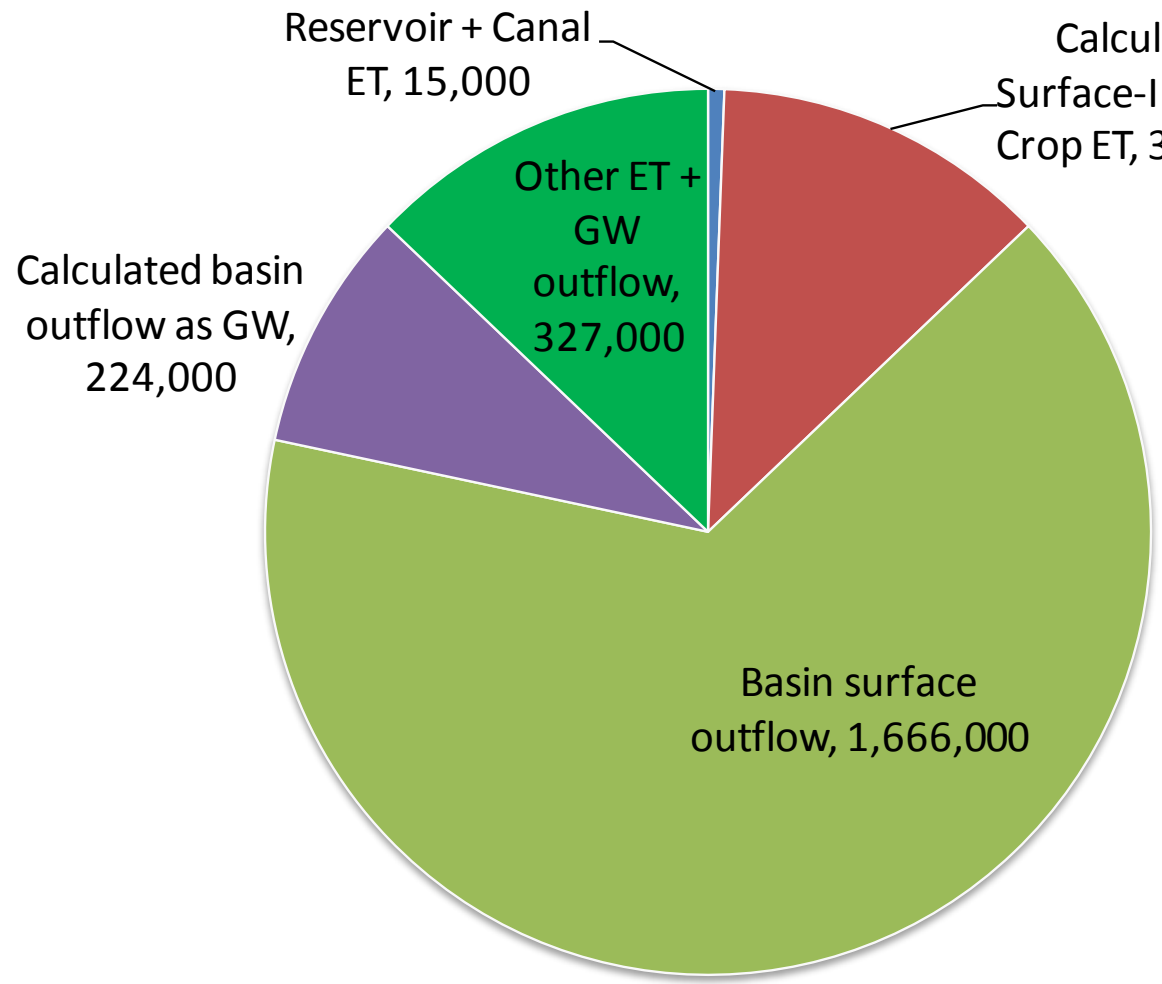
Water Budget for Henry's Fork Surface Diversions



Water Budget Summary

Component	Flow (a-f/yr)
Reservoir + Canal ET	15,000
Surface-Irrigated Crop ET	312,400
Basin surface outflow	1,666,000
Known basin outflow as GW	224,000
Other ET + GW outflow	327,000
Total Surface Supply	2,544,400
Deep GW + Non-irrigated ET	2,333,600
Precipitation (total supply)	4,878,000

Water Budget for Henry's Fork Surface Supply: a-f



Total surface supply = 2,544,000 a-f

Plans for final year of USDA project

- Model GW flow in canal-irrigated regions and integrate into a single watershed-wide model
- Emphasis: effect of canal system on downstream return flows
- Use models to investigate GW flow under four scenarios:
    1. Actual 1979-2008 conditions
    2. All application under flood irrigation ("historic" scenario)
    3. All application under current conditions (90% sprinkler)
    4. 100% irrigation efficiency (no seepage or application in excess of ET)
- Complete analysis of conversion of irrigated land to suburban and resort use
- Present results at two conferences:
    - World Water and Environmental Congress (ASCE), May
    - Annual meeting of American Water Resources Association, November
- Prepare and submit journal articles for peer-reviewed publication
- Develop and distribute educational materials
- Develop water management strategies with Council (focus on land conversion)
- Produce and present summary report for Watershed Council
- Use WIRE process to evaluate usefulness of project outputs