Updated Hydrologic Modeling Results

For Integrated Plan Scenario
Adjusted Scenarios
Climate Change Impacted Scenarios

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Changes in Integrated Plan Scenario

- Modified enlarged Bumping operations to increase spring and early summer hydrograph
- Trying to utilize Bumping more. Right now the model is operating it as an emergency and drought supply only

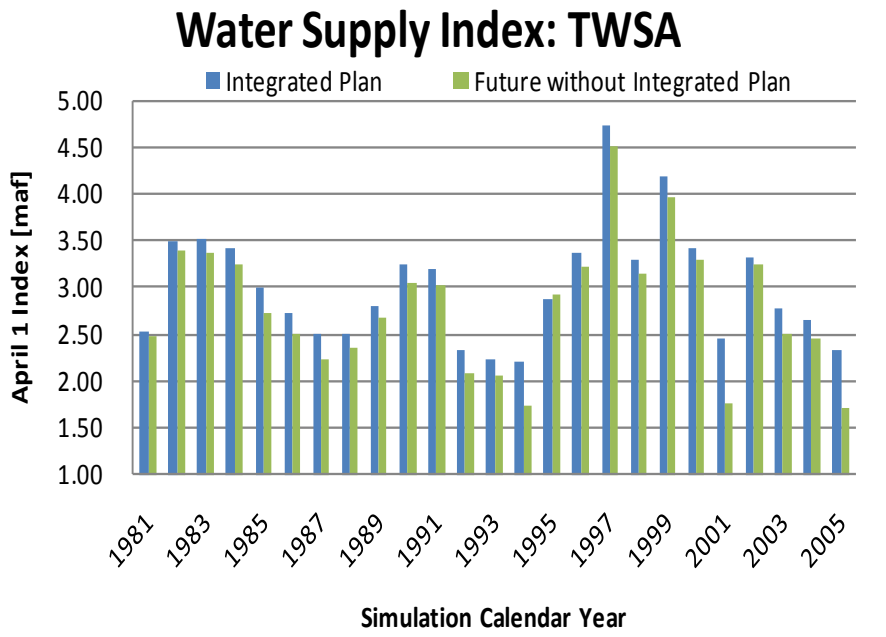
Tabular Summary of Integrated Plan Water Supply Results

Green: Positive change greater than 10% or Prorationing greater than 70%

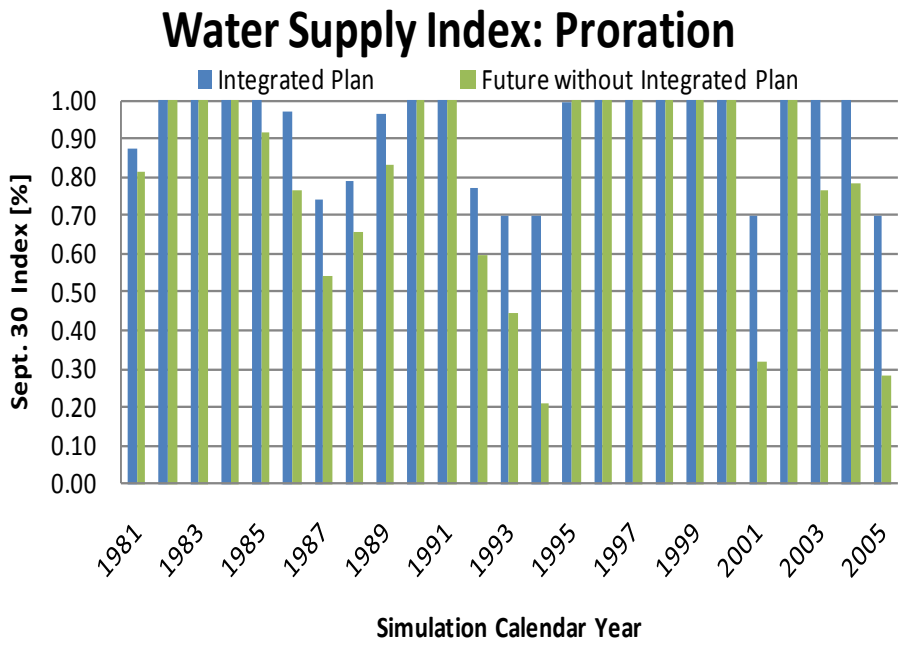
Pink: Negative change greater than 10% or Prorationing less than 70%

Resource indicator (measurement)	Future without Integrated Plan NRNI	Integrated Plan	Change from FWIP
WATER RESOURCES			
Average for water years 1981–2005 (maf)			
April 1 total water supply available (TWSA)	2.79	3.00	0.22
April–September diversion	1.61	1.69	0.09
September 30 reservoir contents	0.23	0.58	0.34
Irrigation proration level	80%	92%	12%
1993 dry-year (maf)			
April 1 total water supply available (TWSA)	2.06	2.24	0.18
April–September diversion	1.42	1.57	0.15
September 30 reservoir contents	0.04	0.26	0.21
Irrigation proration level	44%	70%	26%
1994 dry-year (maf)			
April 1 total water supply available (TWSA)	1.74	2.22	0.48
April–September diversion	1.23	1.52	0.29
September 30 reservoir contents	0.05	-0.07	-0.11
Irrigation proration level	21%	70%	49%
2001 dry-year (maf)			
April 1 total water supply available (TWSA)	1.76	2.45	0.69
April–September diversion	1.29	1.55	0.27
September 30 reservoir contents	0.06	0.22	0.16
Irrigation proration level	32%	70%	38%
2005 dry-year (maf)			
April 1 total water supply available (TWSA)	1.71	2.32	0.61
April–September diversion	1.25	1.53	0.28
September 30 reservoir contents	0.08	0.12	0.05
Irrigation proration level	28%	70%	42%

Water Supply Result Highlights -TWSA and Prorationing

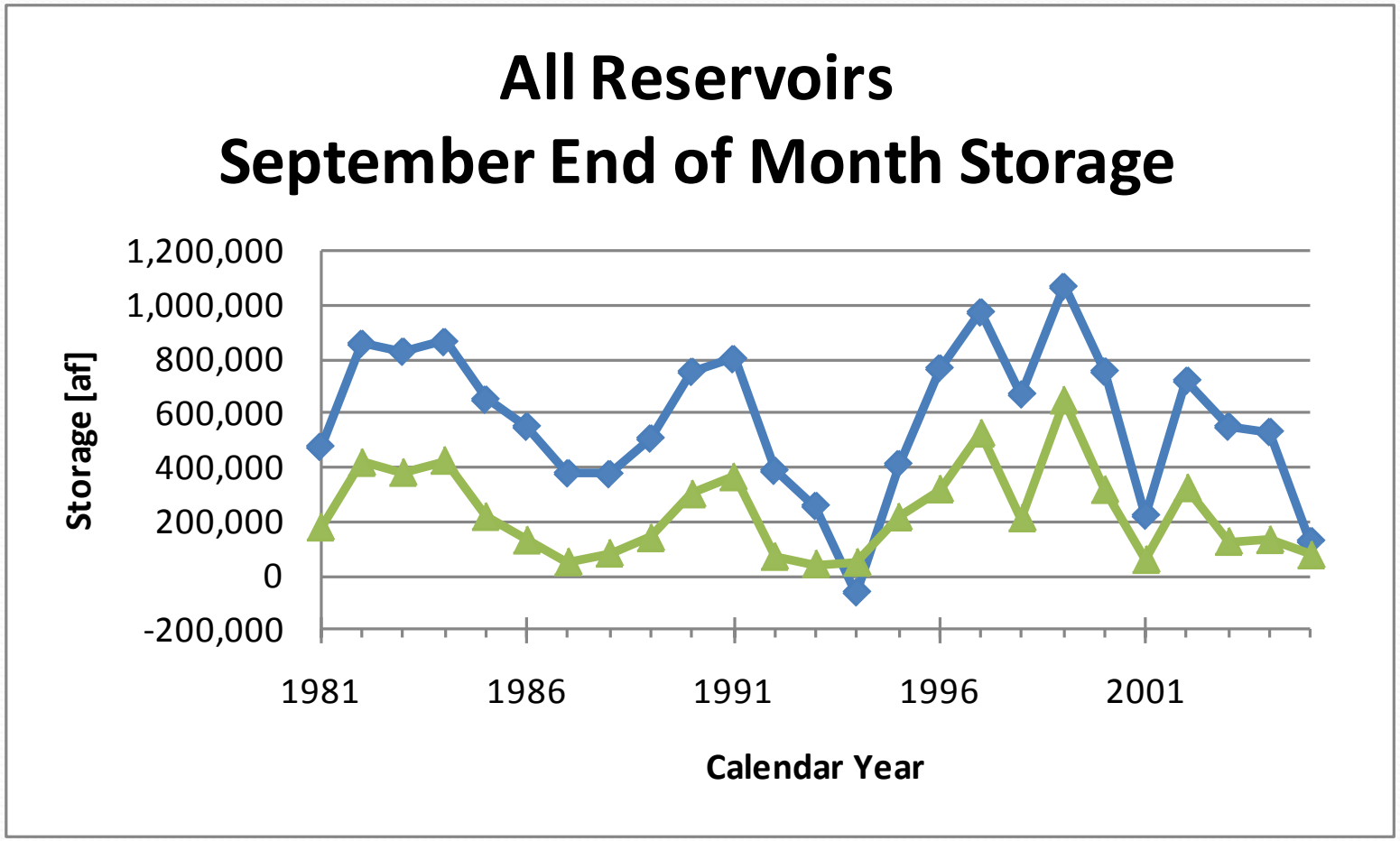


Slot: TWSA PARW_DataDailyTWSA



Slot: TWSA PARW_DataDailyProration Level

Water Supply Result Highlights -Reservoir Storage



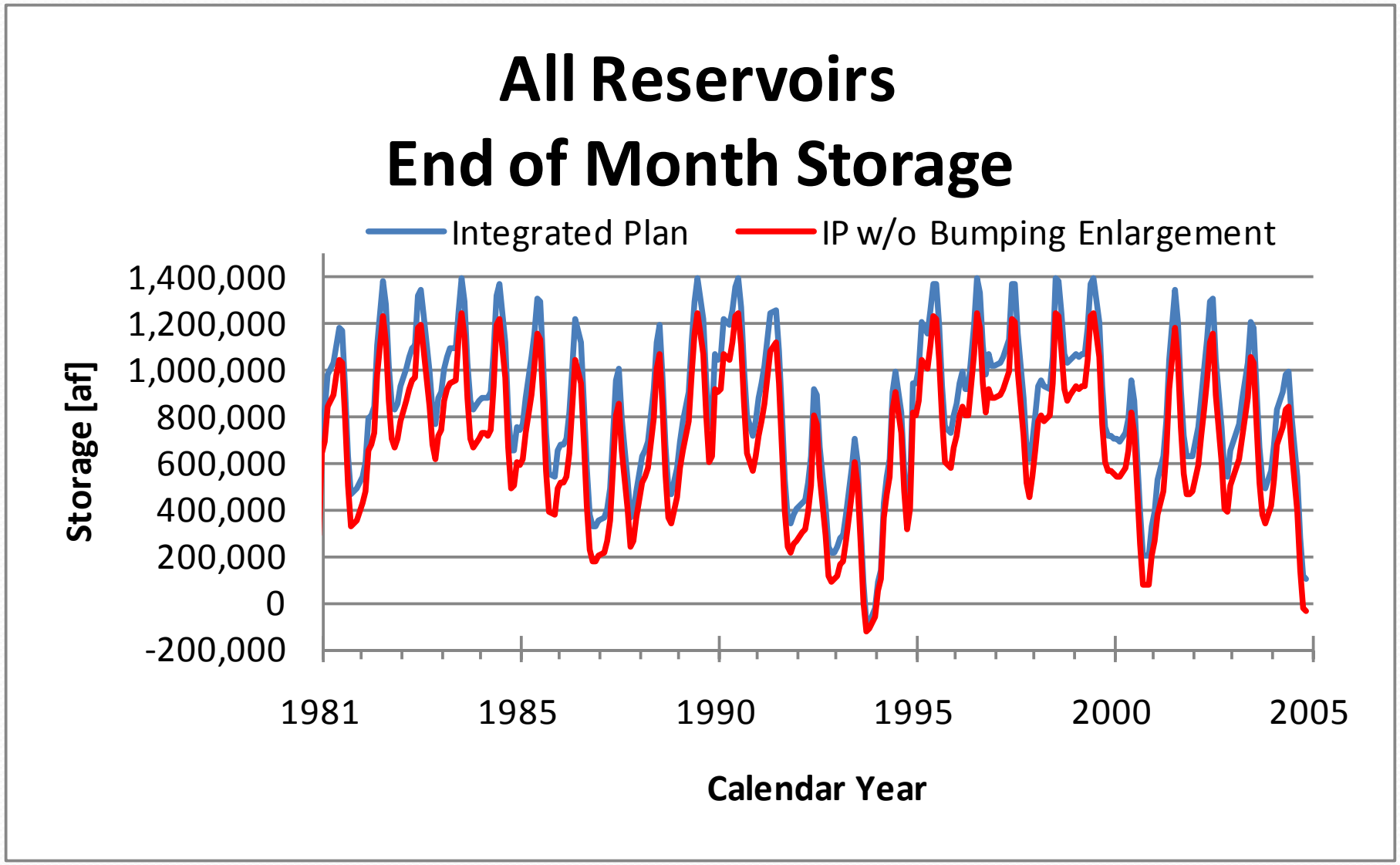
Summary of Integrated Plan Instream Flow Results

- **Flow Improvement Matrix (handout)**:
  - 13 of 14 reaches show improvement in meeting Flow Objectives
  - 6 of these are substantial improvement
  - Nearly 200,000 acre-feet of additional water is in carryover storage to provide additional improvement in flows, if desired
  - Subordination at Chandler and Roza could also improve flows in the mainstem Yakima River.
  - KRD South Branch project could improve flow in tributaries.

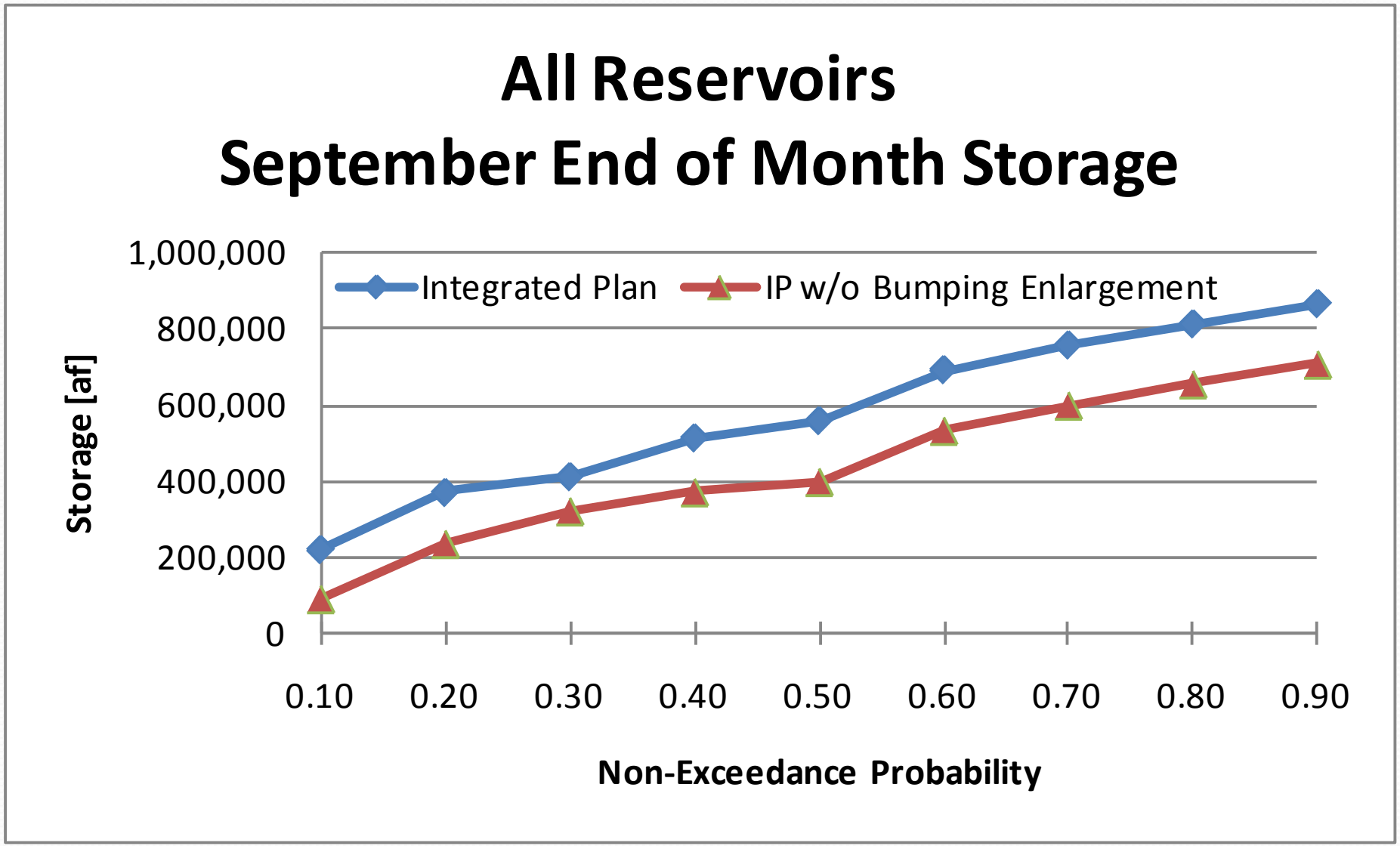
Adjusted Scenarios

- There Adjusted Scenarios are just the Integrated Plan without one of the Major Projects
- The Adjusted Scenarios provide less water for irrigation and do not meet the 70% prorationing water supply goal.
- The Adjusted Scenarios provide less water for instream flow benefits.
- The Adjusted Scenarios provide less carryover storage and less reliability if conditions are worse than 1981-2005.

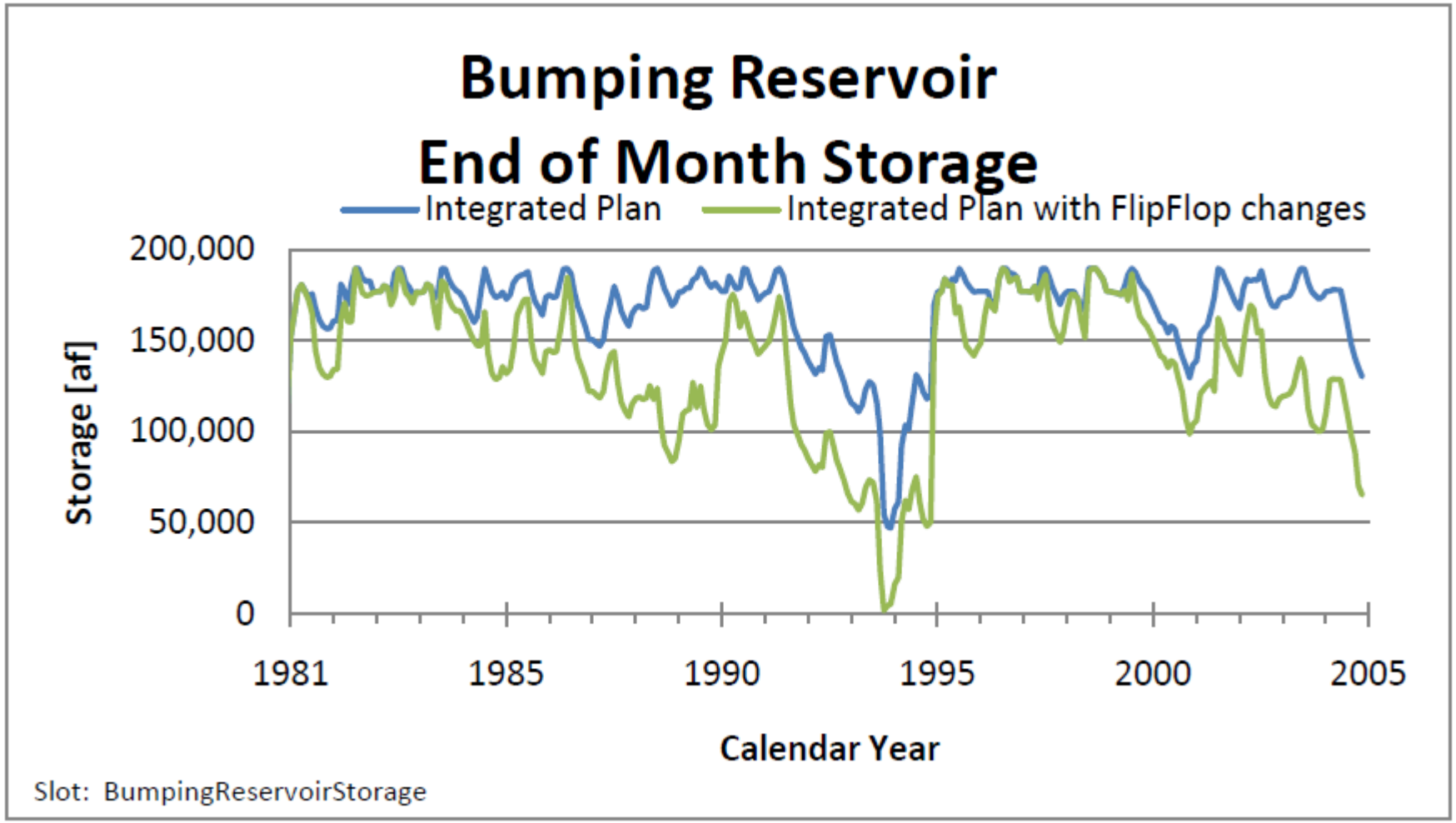
Adjusted Scenarios – Example #1



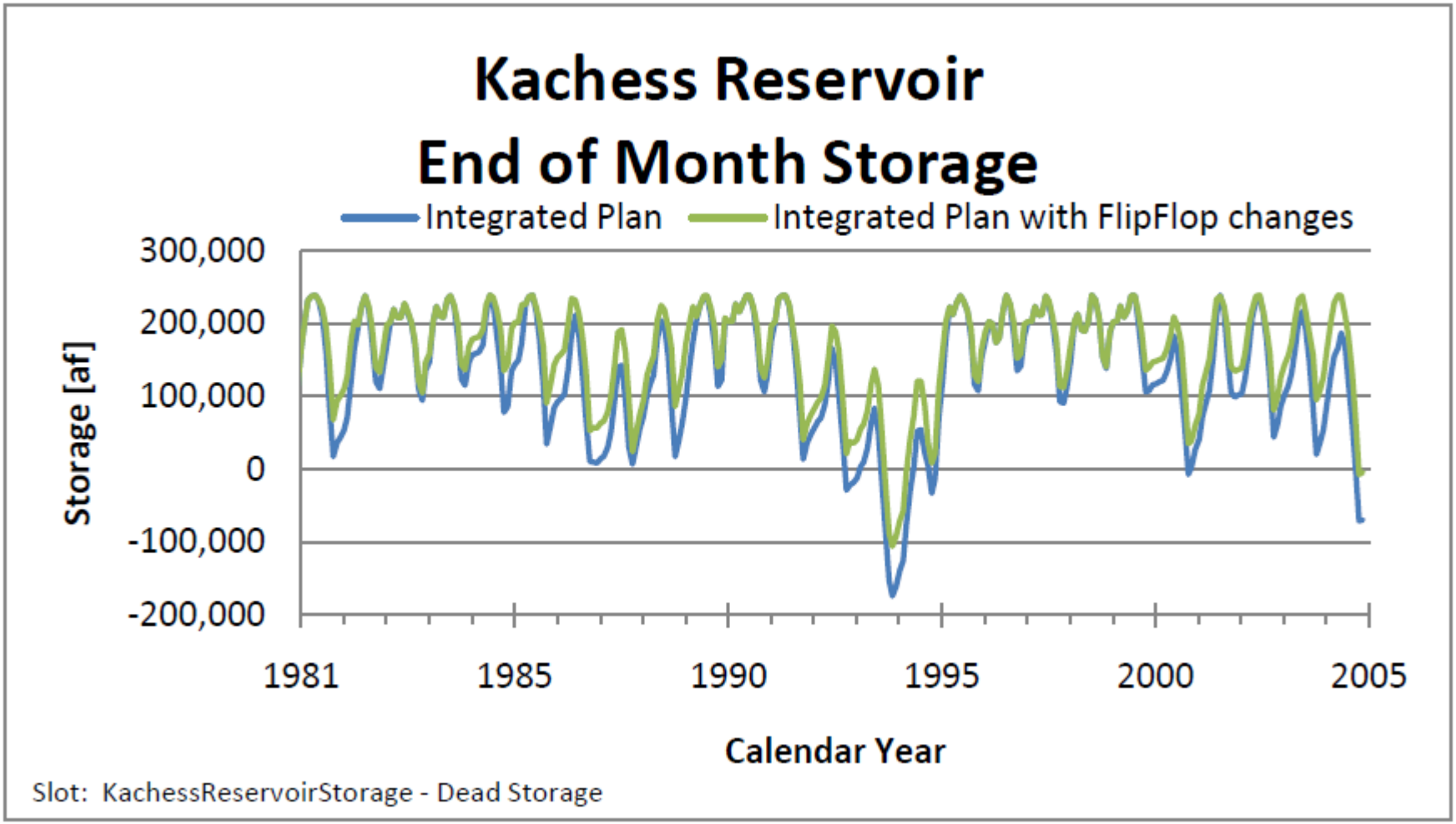
Adjusted Scenarios – Example #1



Adjusted Scenarios – Example #2



Adjusted Scenarios – Example #2



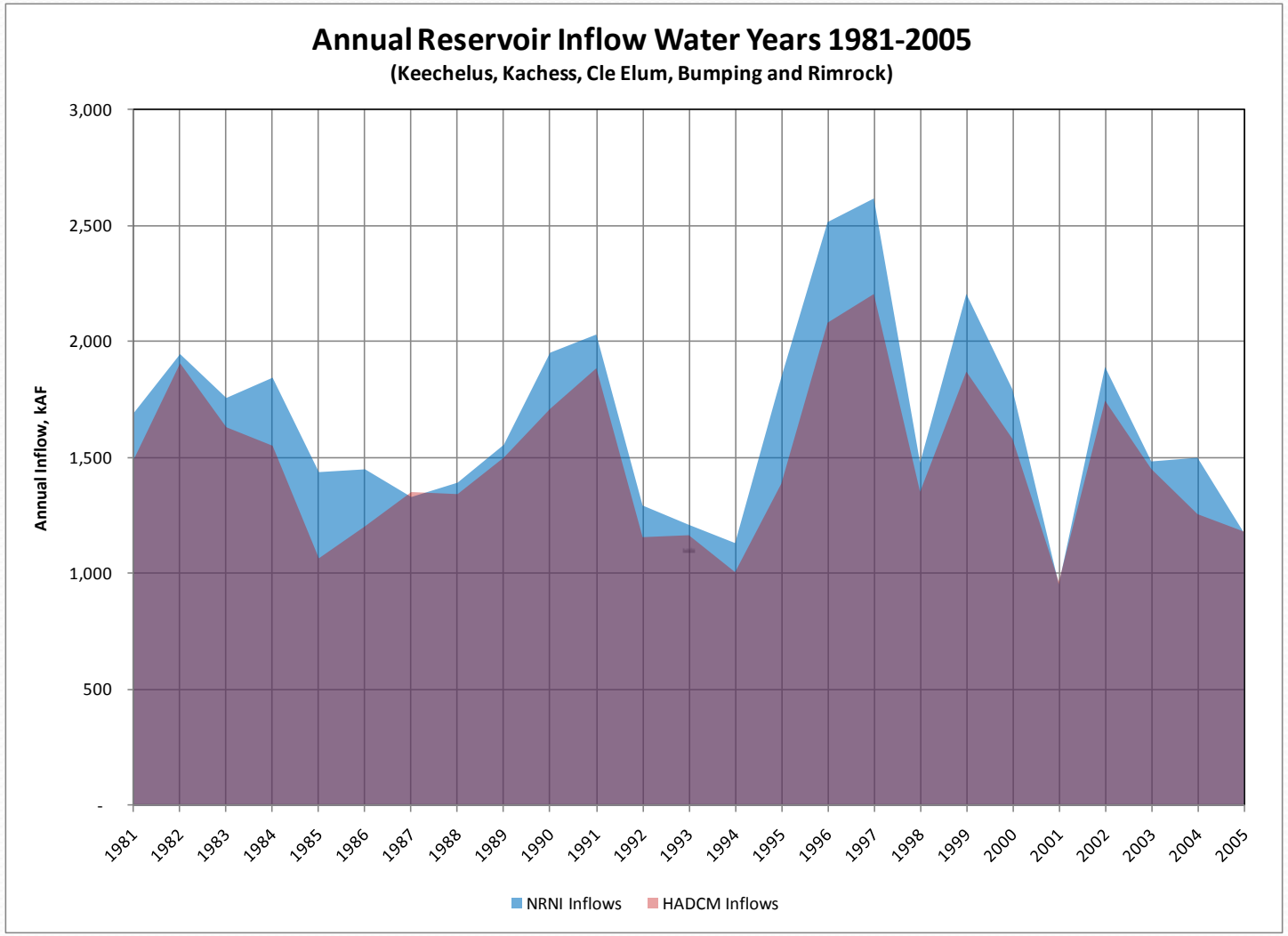
Effects of Potential Climate Change On Integrated Plan Benefits

THREE POTENTIAL SETS OF CLIMATE CHANGE CONDITIONS REPRESENTING 2040 WERE EVALUATED:

All three include 9% average increase in Irrigation Demand and 5% average increase in M&I Demand

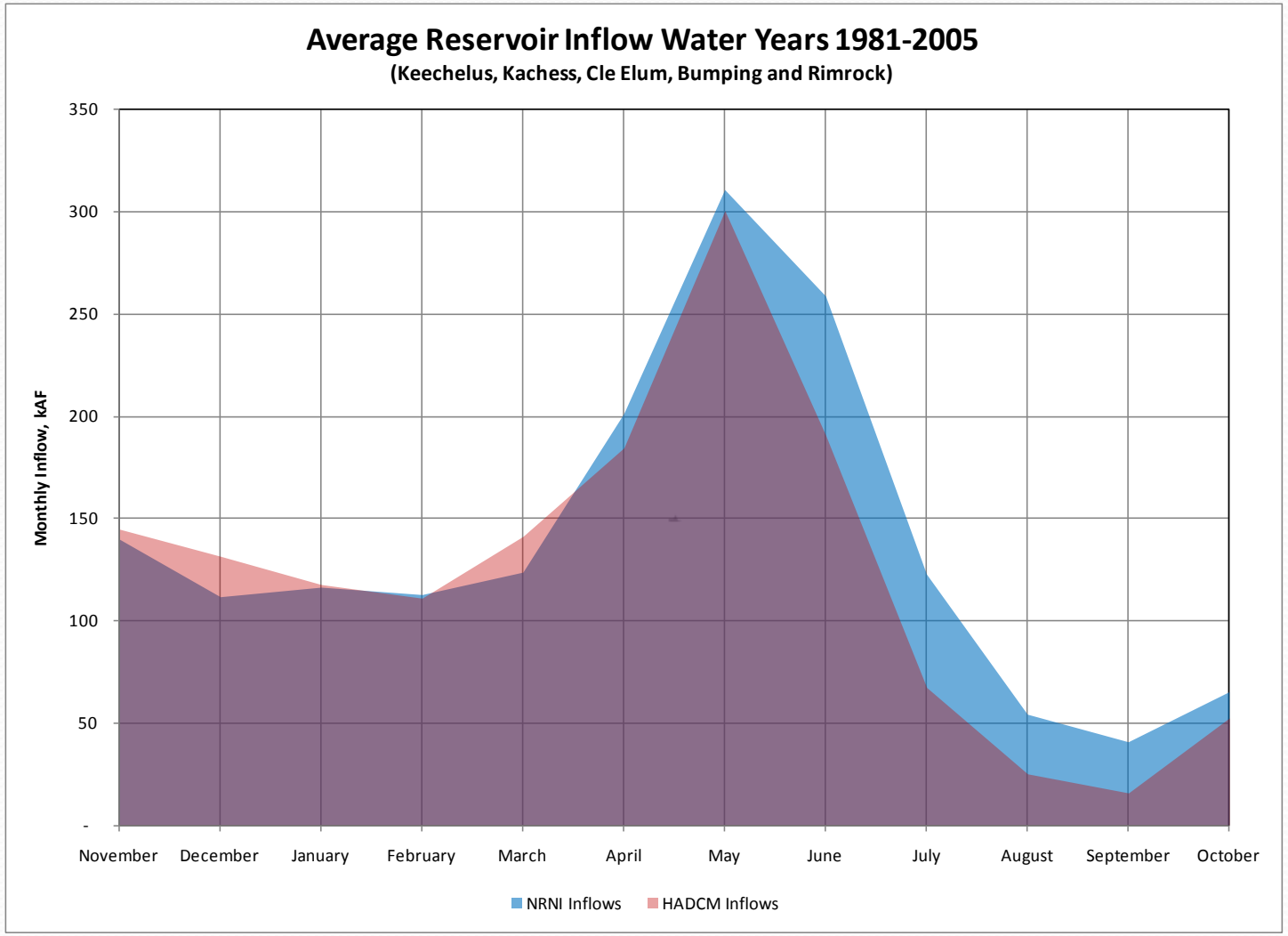
- **Less Adverse**: 8.8 % average increase in Precipitation; 1.2 ºC average temperature increase.
- **Moderately Adverse**: 3.8 % average increase in Precipitation; 1.0 ºC average temperature increase.
- **More Adverse** : 1.5 % average decrease in Precipitation; 1.3 ºC average temperature increase.

Effects of Potential Climate Change On Integrated Plan Benefits



On average, 11% less inflow (200 Kaf)

Effects of Potential Climate Change On Integrated Plan Benefits



35% less inflow in June - Oct (170 Kaf)

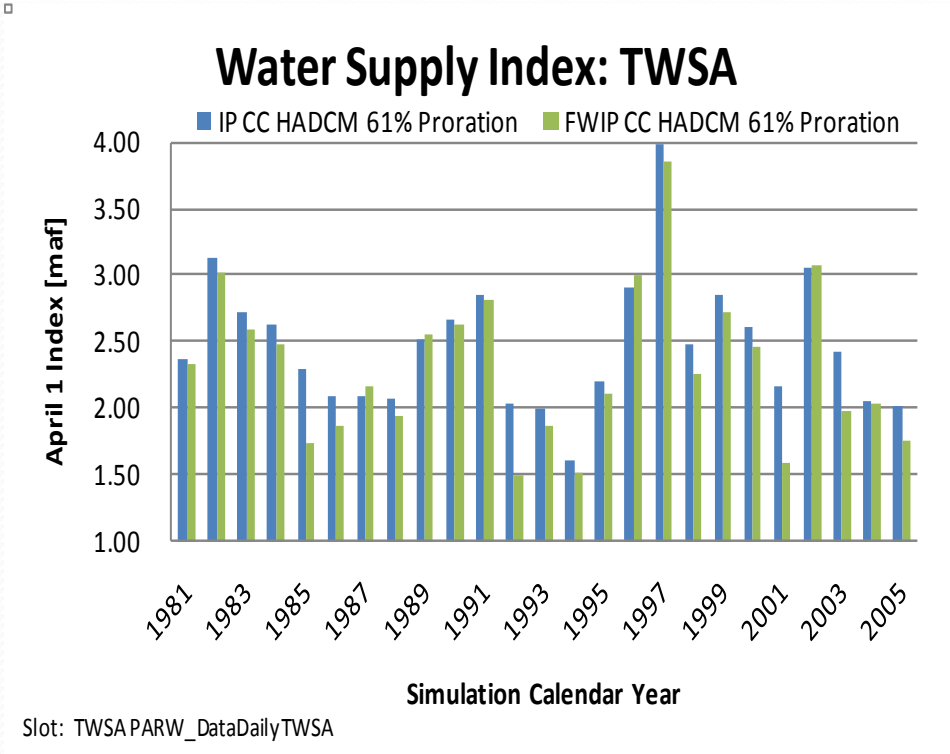
Effects of Potential Climate Change On Integrated Plan Benefits

Green: Positive change greater than 10% or Prorationing greater than 70%

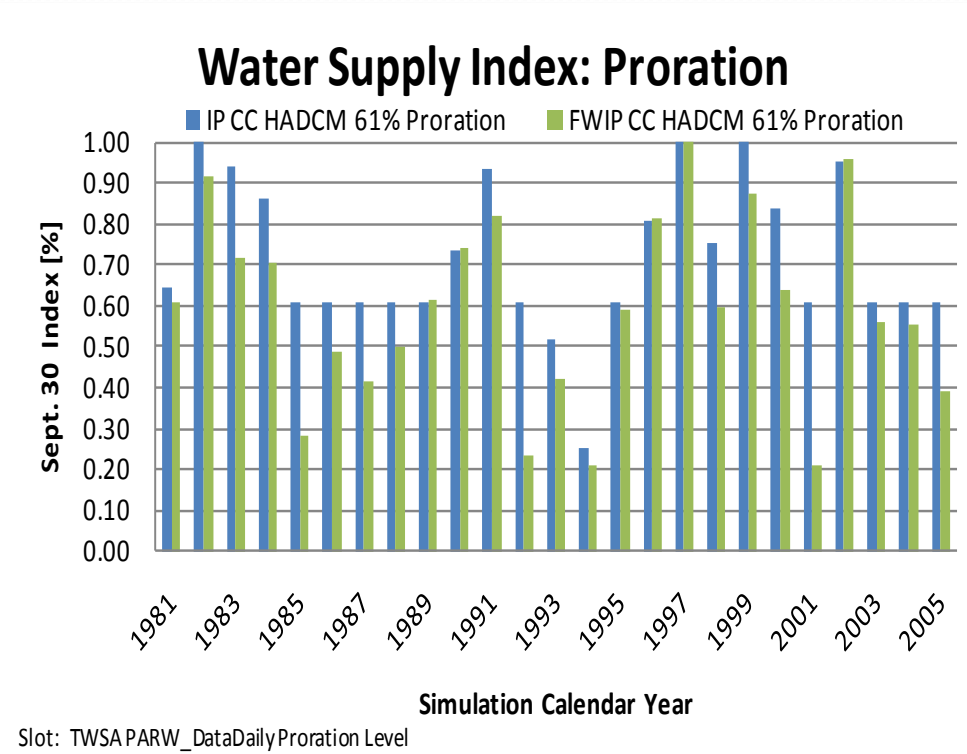
Pink: Negative change greater than 10% or Prorationing less than 70% (61% climate impacted)

Resource indicator (measurement)	Future without Integrated Plan NRNI	Integrated Plan NRNI	Integ Plan - Moderately Adverse
WATER RESOURCES			
Average for water years 1981–2005 (maf)			
April 1 total water supply available (TWSA)	2.79	3.00	2.47
April–September diversion	1.61	1.69	1.64
September 30 reservoir contents	0.23	0.58	0.17
Irrigation proration level	80%	92%	72%
1993 dry-year (maf)			
April 1 total water supply available (TWSA)	2.06	2.24	2.00
April–September diversion	1.42	1.57	1.46
September 30 reservoir contents	0.04	0.26	-0.16
Irrigation proration level	44%	70%	52%
1994 dry-year (maf)			
April 1 total water supply available (TWSA)	1.74	2.22	1.60
April–September diversion	1.23	1.52	1.20
September 30 reservoir contents	0.05	-0.07	-0.17
Irrigation proration level	21%	70%	25%
2001 dry-year (maf)			
April 1 total water supply available (TWSA)	1.76	2.45	2.16
April–September diversion	1.29	1.55	1.49
September 30 reservoir contents	0.06	0.22	-0.06
Irrigation proration level	32%	70%	61%
2005 dry-year (maf)			
April 1 total water supply available (TWSA)	1.71	2.32	2.02
April–September diversion	1.25	1.53	1.46
September 30 reservoir contents	0.08	0.12	-0.12
Irrigation proration level	28%	70%	61%

Effects of Potential Climate Change On Integrated Plan Benefits

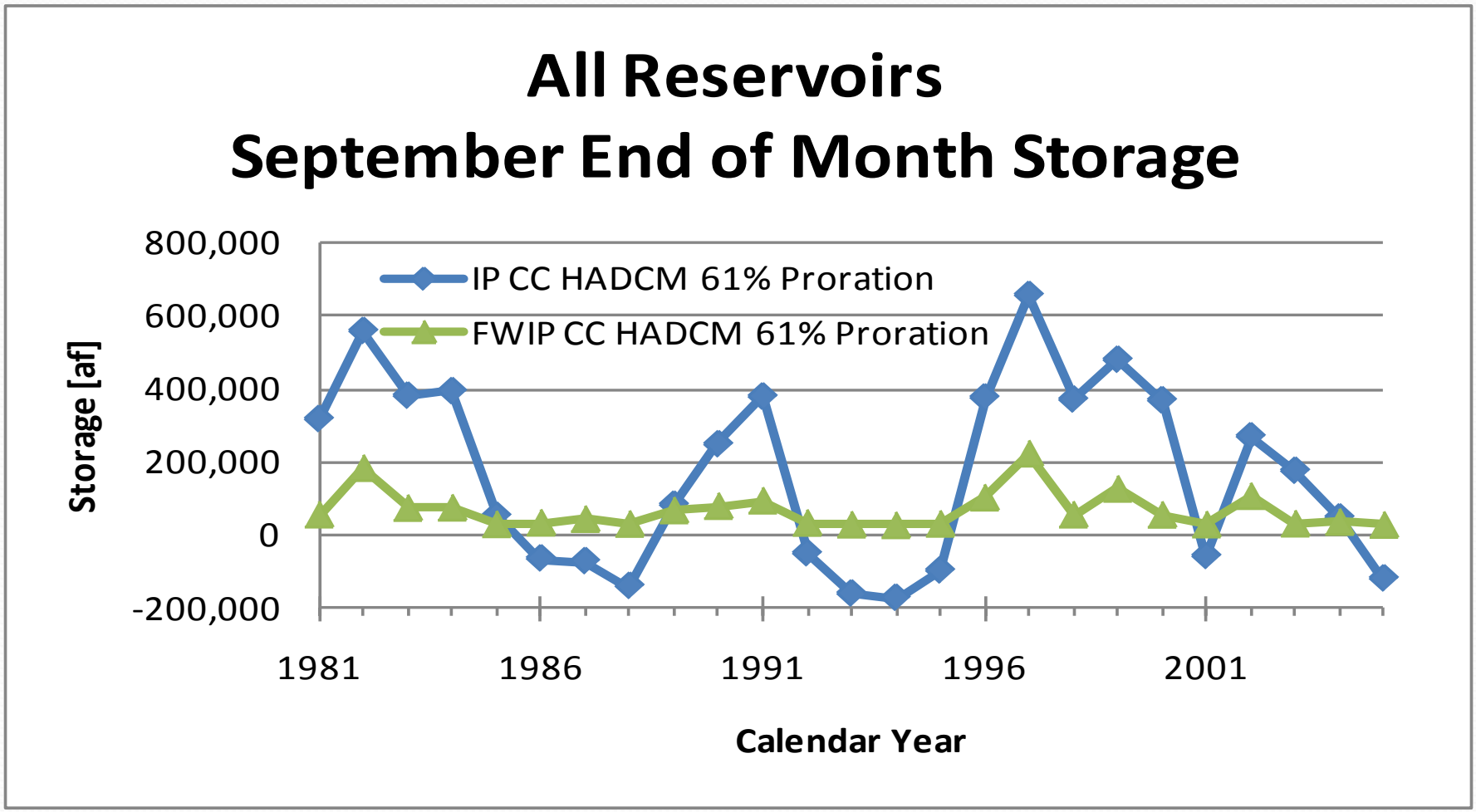


Slot: TWSA PARW_DataDailyTWSA



Slot: TWSA PARW_DataDailyProration Level

Effects of Potential Climate Change On Integrated Plan Benefits



Effects of Potential Climate Change On Integrated Plan Benefits

- The predicted Climate Change scenarios would reduce summer flows and increase needs for storage
- The Integrated Plan would deliver comparable benefits under the predicted Climate Change scenarios
- The Integrated Plan would not meet the 70% Prorationing goal under the moderately adverse Climate Change scenario