

Updated Hydrologic Modeling Results

Comparing Two Scenarios – Future Without
Integrated Plan
and Integrated Plan

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Scenario Descriptions

- Future without Integrated Plan
 - Future M&I Demands
 - YRBWEP Conservation
- Integrated Plan
 - Non-Surface Storage Projects
 - Enhanced Conservation
 - GW Infiltration
 - Surface Storage Projects
 - K to K Pipeline
 - Kachess Inactive Storage
 - Wymer Reservoir
 - Enlarged Bumping Reservoir
 - Enlarged Cle Elum Reservoir

Disclaimer

- Results discussed today are draft
- Modeling assumptions are still being refined; results will be updated

Model Changes

- Bumping storage targets and minimum outflows
- Storage carry-over tables
- Irrigation conservation benefits accrue to TWSA
- Water conservation values based on current and future achievable levels
- Spring pulse flows provided downstream of reservoirs
- Parker Title XII flows are calculated based on TWSA plus groundwater recharge, Wymer instream account, and instream conservation benefits
- Future Municipal and Industrial consumptive demands

Model Changes Continued

- Two prorationing values are calculated: original and integrated plan
- Flip-flop operations only adjusted for integrated plan projects
- Increased Kachess inactive tunnel/pump capacity from 1,000 cfs to 1,200 cfs
- Wymer can fill from Keechelus/Cle Elum releases and flood flows
- New storage projects are used only when prorationing is below 70%. Supply is used to increase prorationing to 70%
- Groundwater infiltration based on preliminary info provided by Golder (This is only a “rough guess” as to how these projects might work.)

Modeling Results

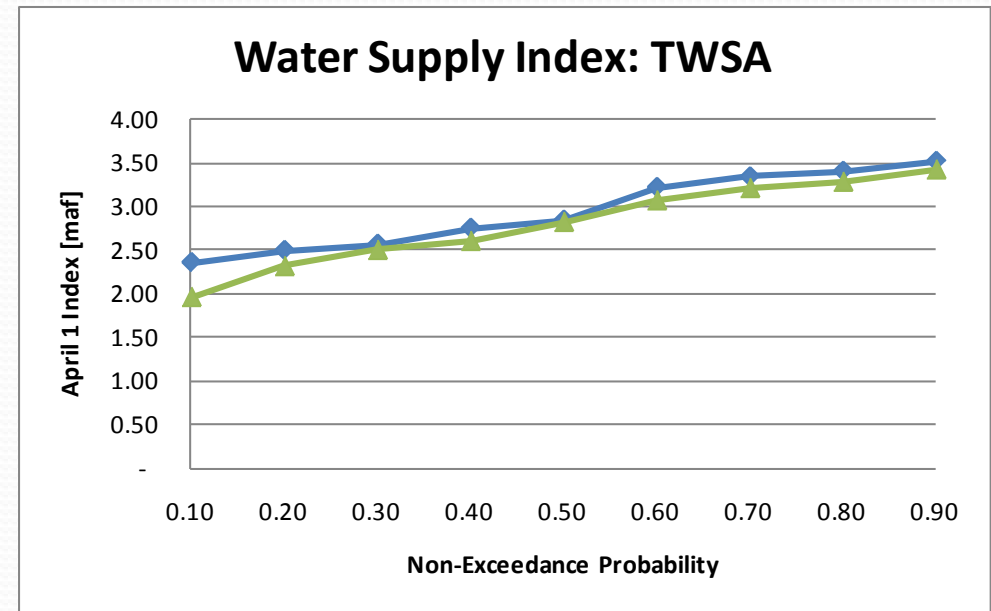
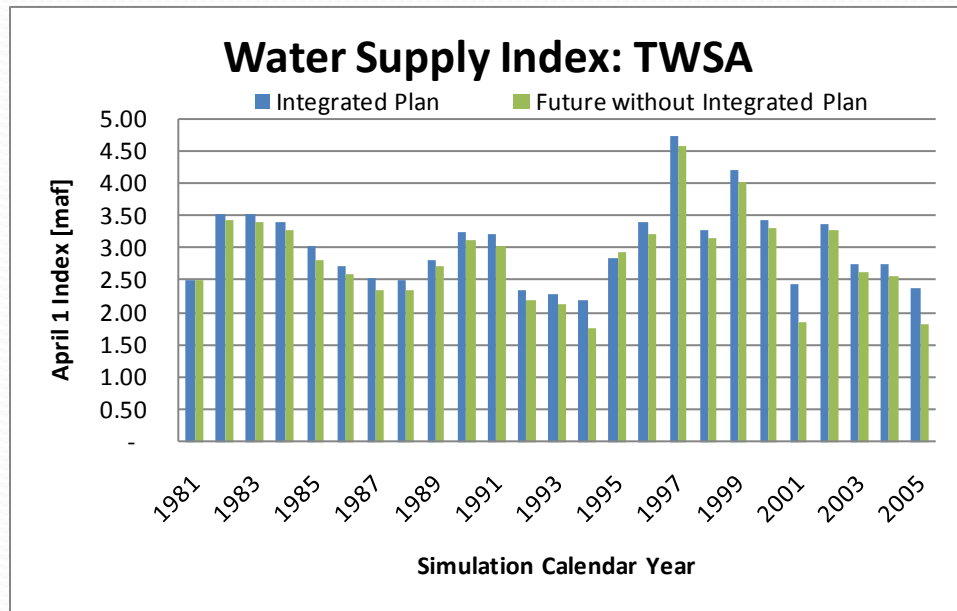
Primary Metrics:

- TWSA
- % Proration
- Reservoir Content & Levels
- Average Daily Hydrographs
- Dry and Average Year Hydrographs
- DSS Model Results

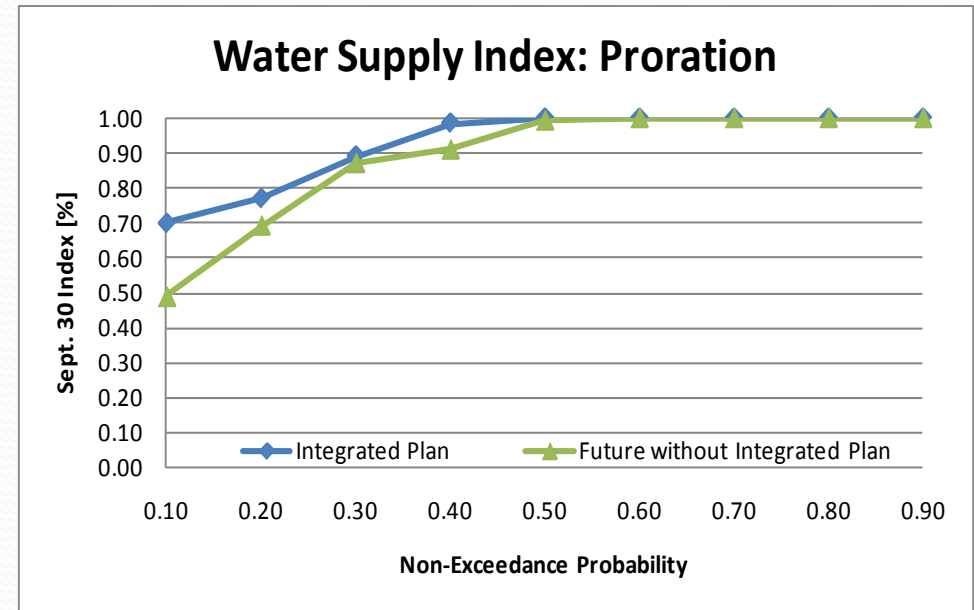
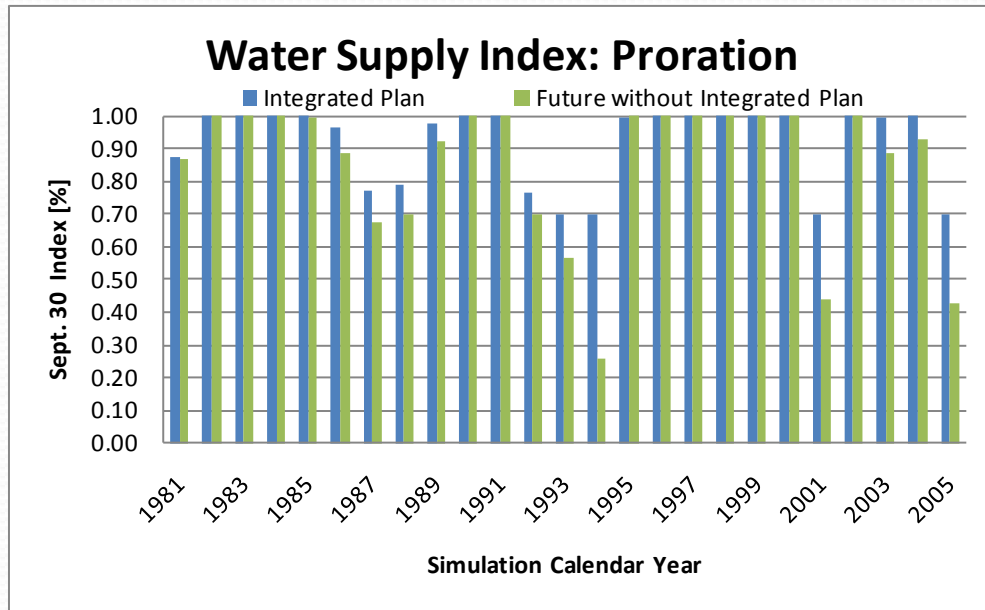
Summary of Draft Results

Hydrologic Indicator	Future without Integrated Plan					Non-Structural Conditions					Integrated Plan				
	Average 1981- 2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Wet Year 1997	Average 1981- 2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Wet Year 1997	Average 1981- 2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Wet Year 1997
April 1 TWSA (maf)	2.84	1.75	1.86	1.82	4.56	2.90	1.79	1.93	1.89	4.63	3.01	2.20	2.44	2.39	4.71
April-September flow volume at Parker gage (kaf)	607	276	203	197	1920	630	259	197	189	1976	588	236	191	184	1898
March-October flow volume at Parker gage (kaf)	915	431	342	319	2617	941	401	322	303	2695	904	399	337	298	2635
April-September diversion volume upstream of Parker gage (maf)	1.61	1.24	1.36	1.34	1.68	1.60	1.28	1.44	1.41	1.65	1.64	1.53	1.54	1.54	1.68
September 30 non- Bumping or Wymer reservoir contents (kaf)	295	66	89	103	595	318	35	40	47	626	390	-105	128	101	734
October 31 non- Bumping or Wymer reservoir contents (kaf)	286	68	86	97	705	309	62	63	49	738	367	-107	122	93	817
September 30 Bumping and Wymer reservoir contents (kaf)	16	13	15	15	18	15	2	3	4	18	197	36	93	88	240
April-September flow volume at mouth of Yakima River (kaf)	851	348	250	283	2228	1030	470	381	415	2449	990	463	386	418	2371
Irrigation proration level (percent)1	85%	26%	44%	43%	100%	87%	37%	56%	52%	100%	92%	70%	70%	70%	100%

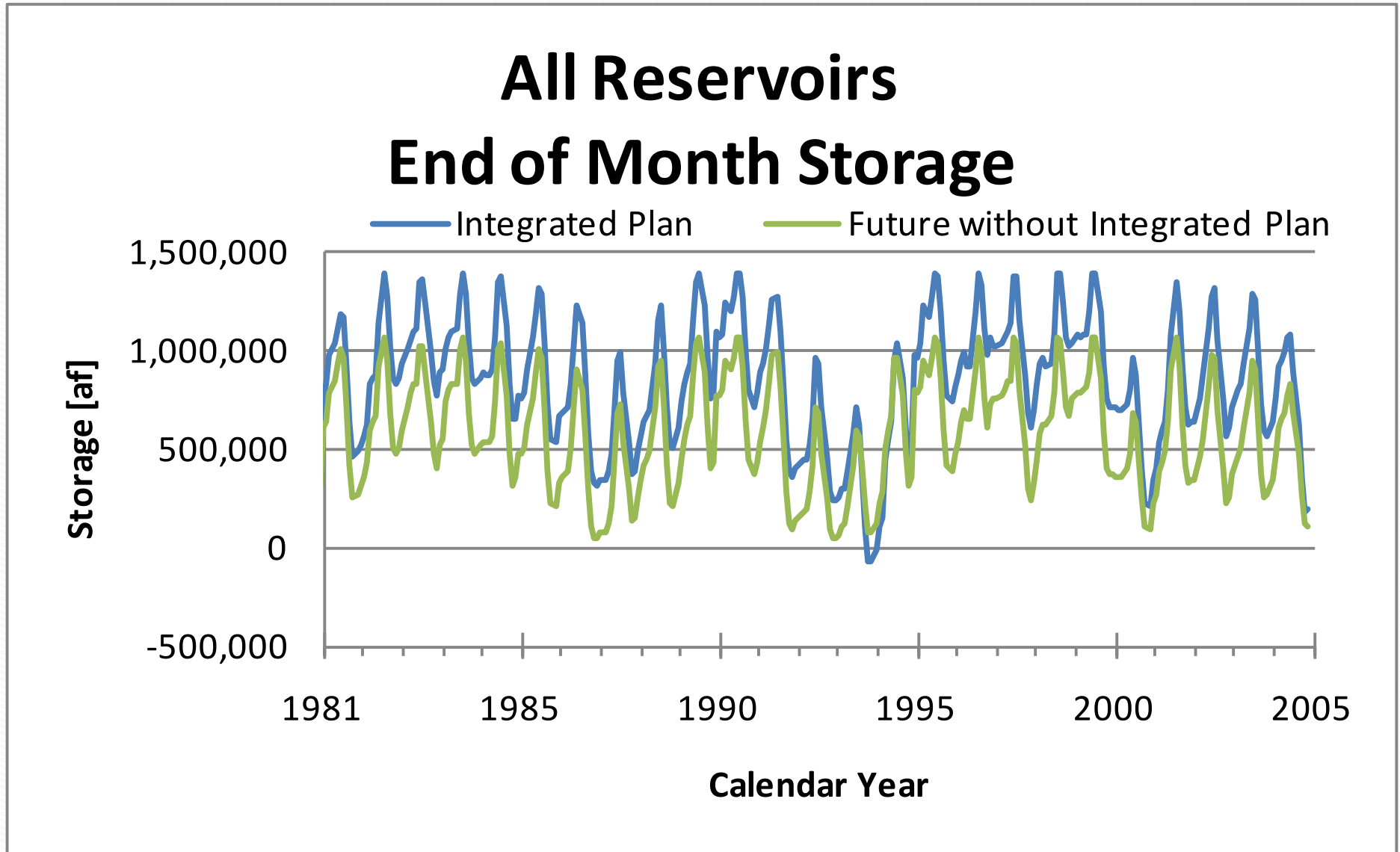
TWSA: Integrated Plan



Proration: Integrated Plan

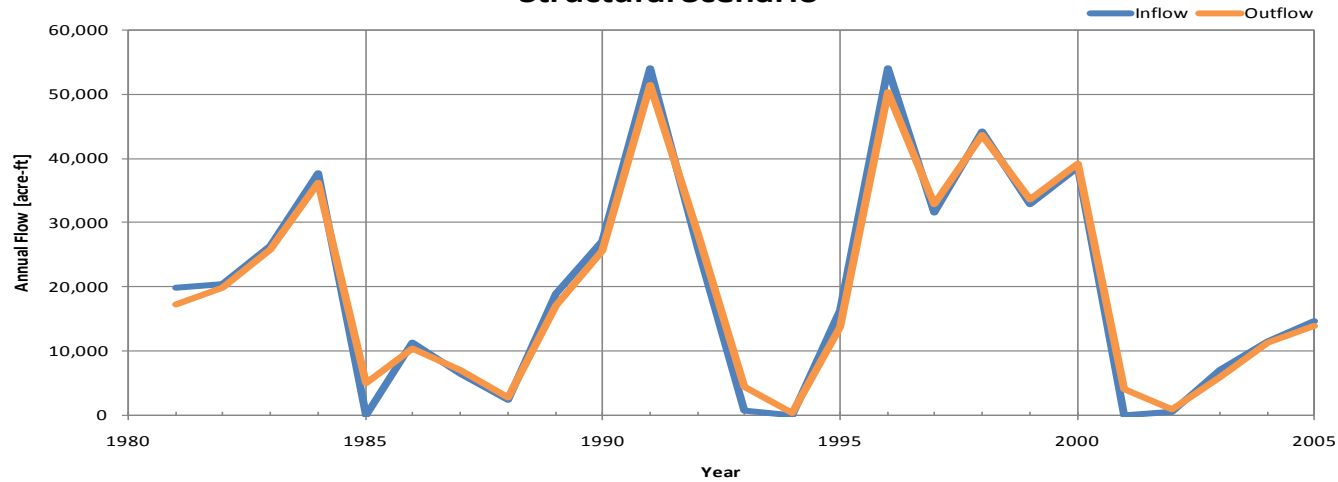


End of Month Storage: Integrated Plan

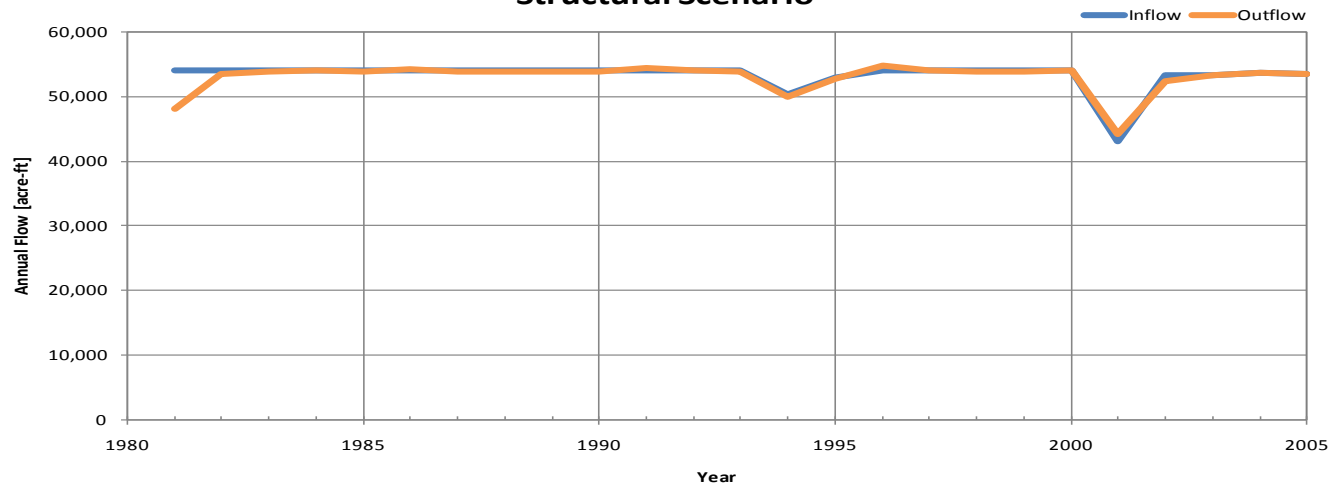


GW Recharge and Outflow

**Proposed Thorp Groundwater Recharge Area
Structural Scenario**

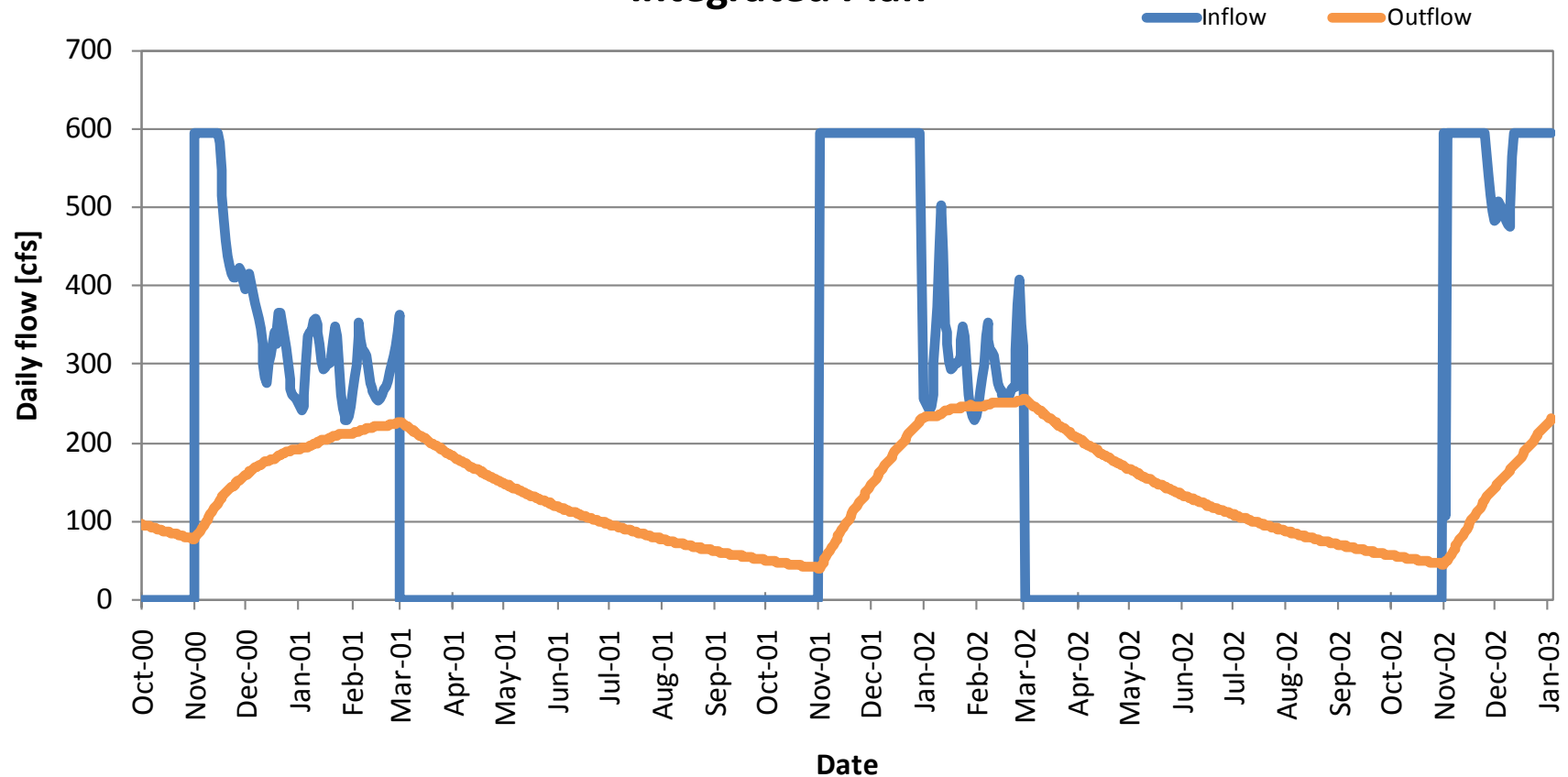


**Proposed WIP Groundwater Recharge Area
Structural Scenario**

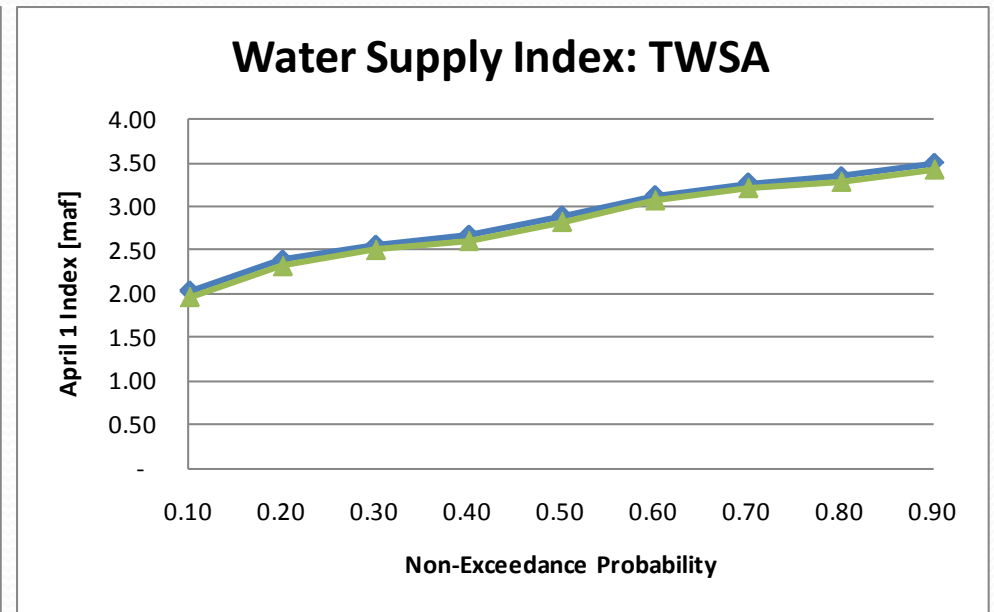
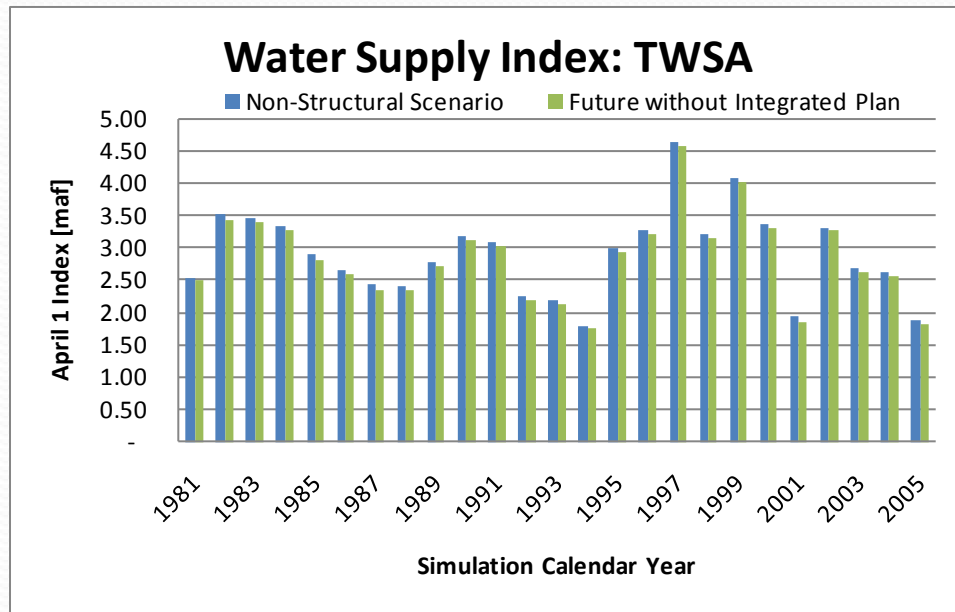


GW Recharge and Outflow

**Combined WIP and Thorp Groundwater Recharge Areas
Integrated Plan**

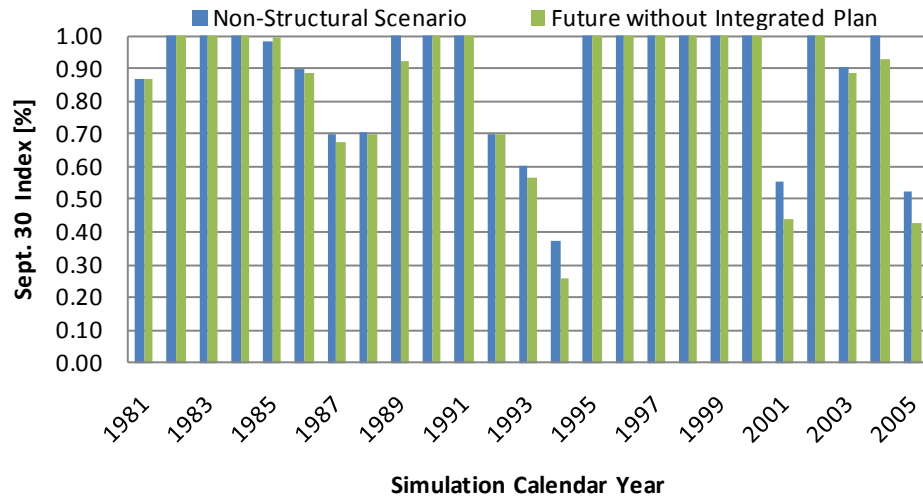


TWSA: Non-Structural

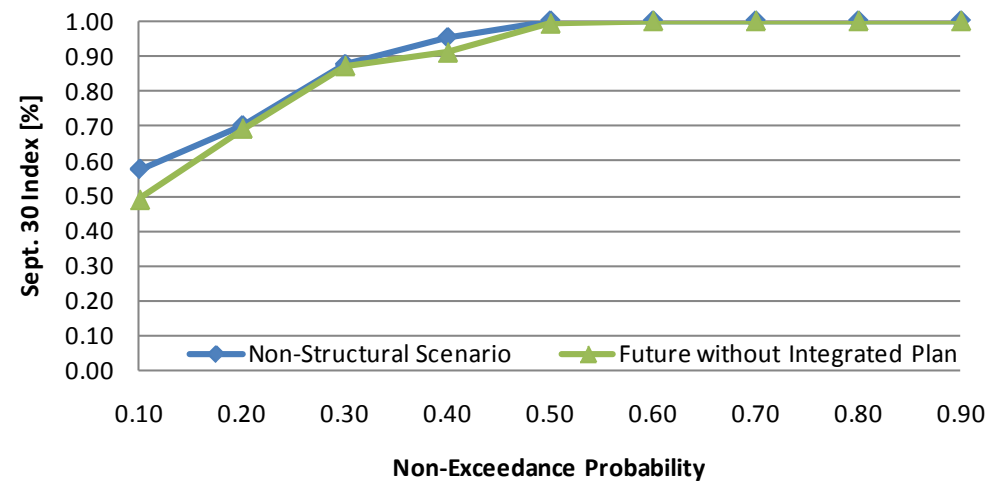


Proration: Non-Structural

Water Supply Index: Proration

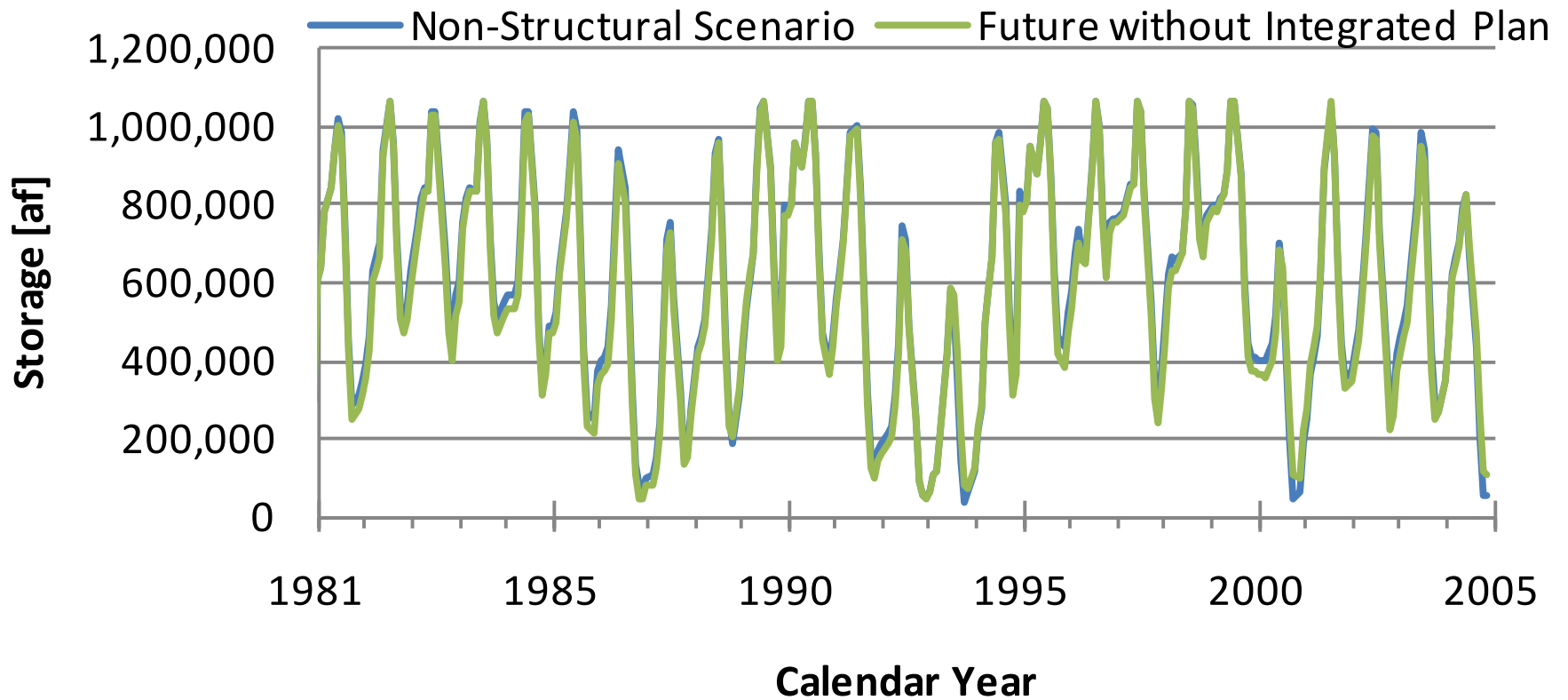


Water Supply Index: Proration

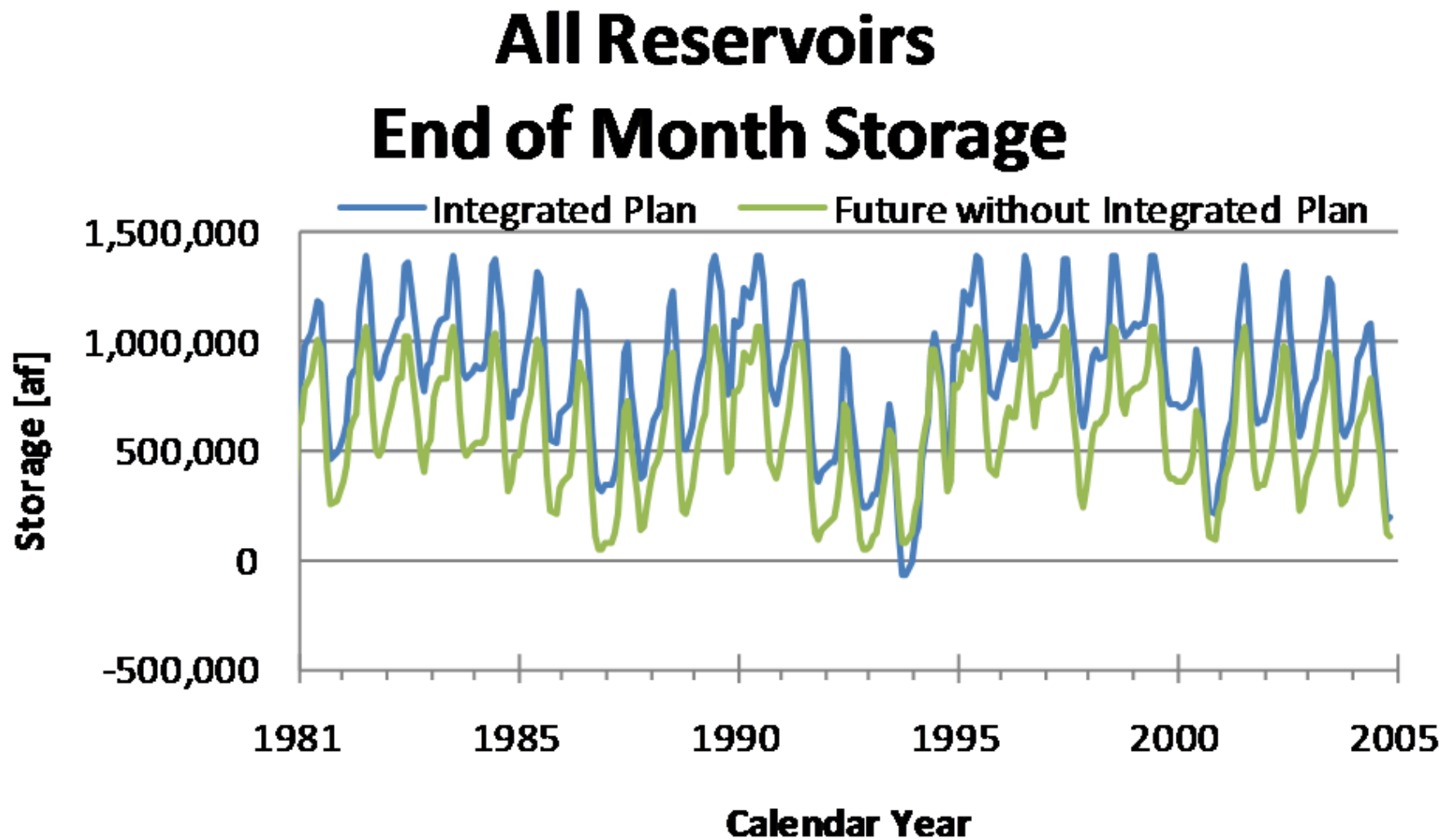


End of Month Storage: Non-Structural

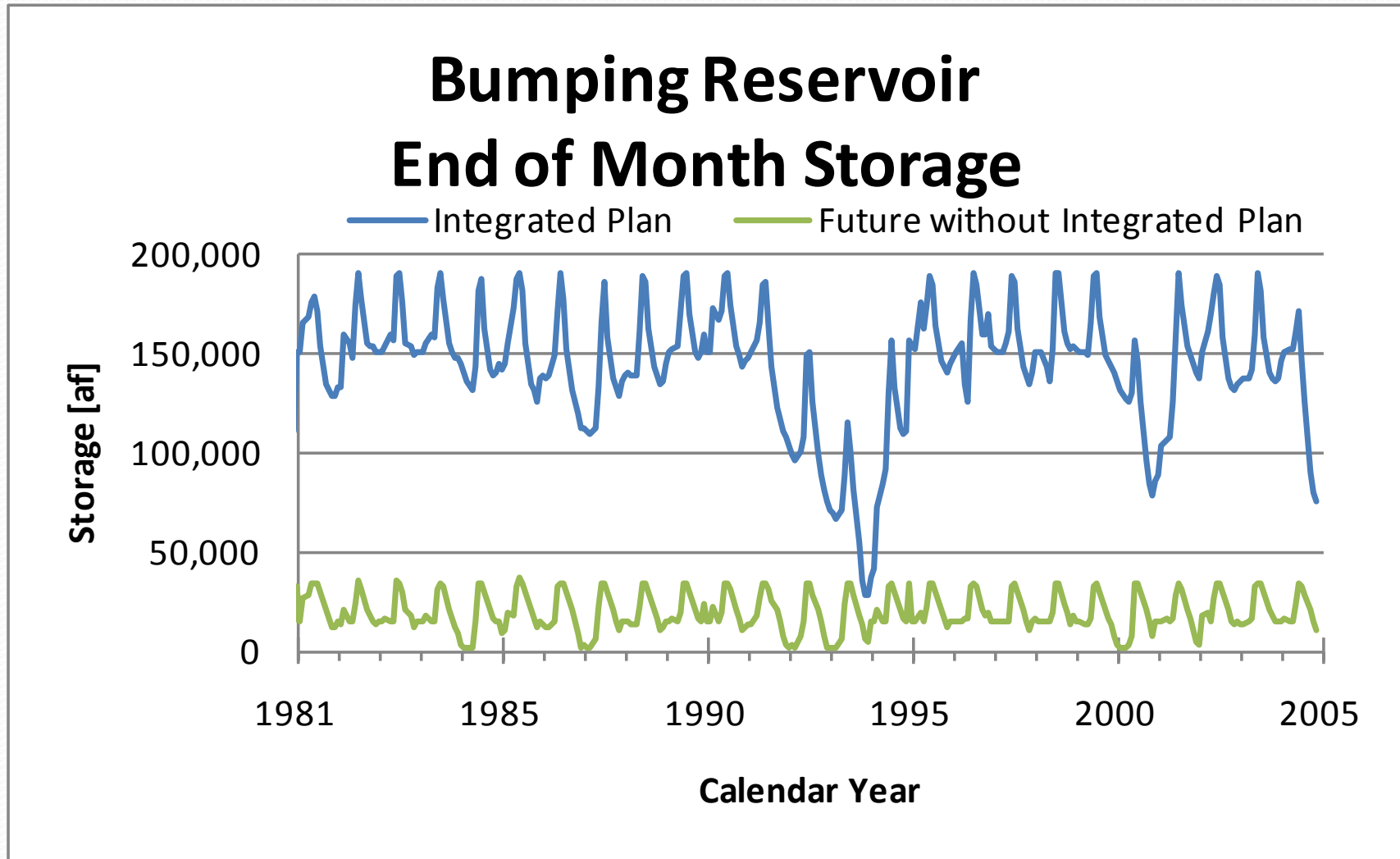
All Reservoirs End of Month Storage



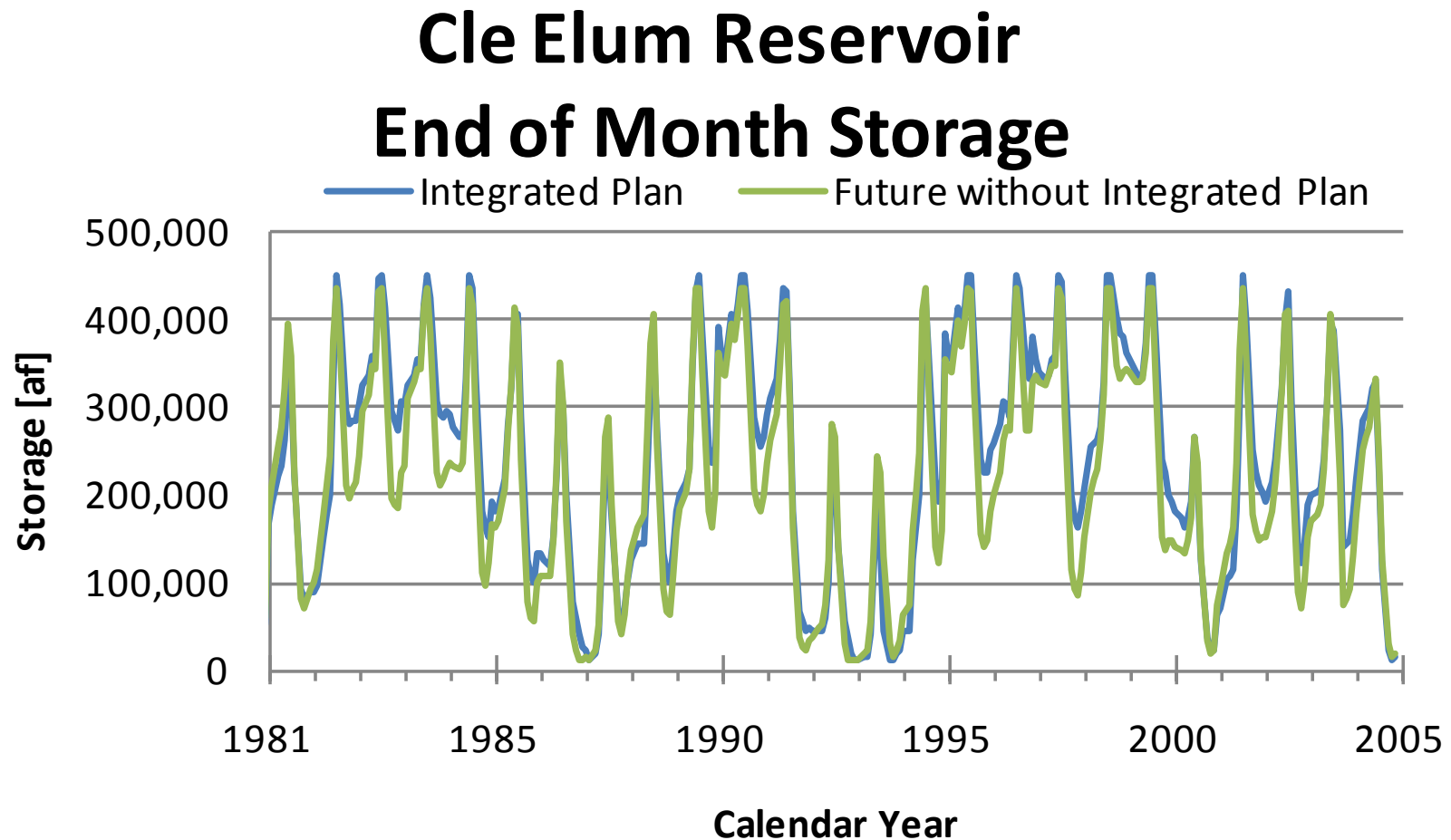
End of Month Storage: Integrated Plan



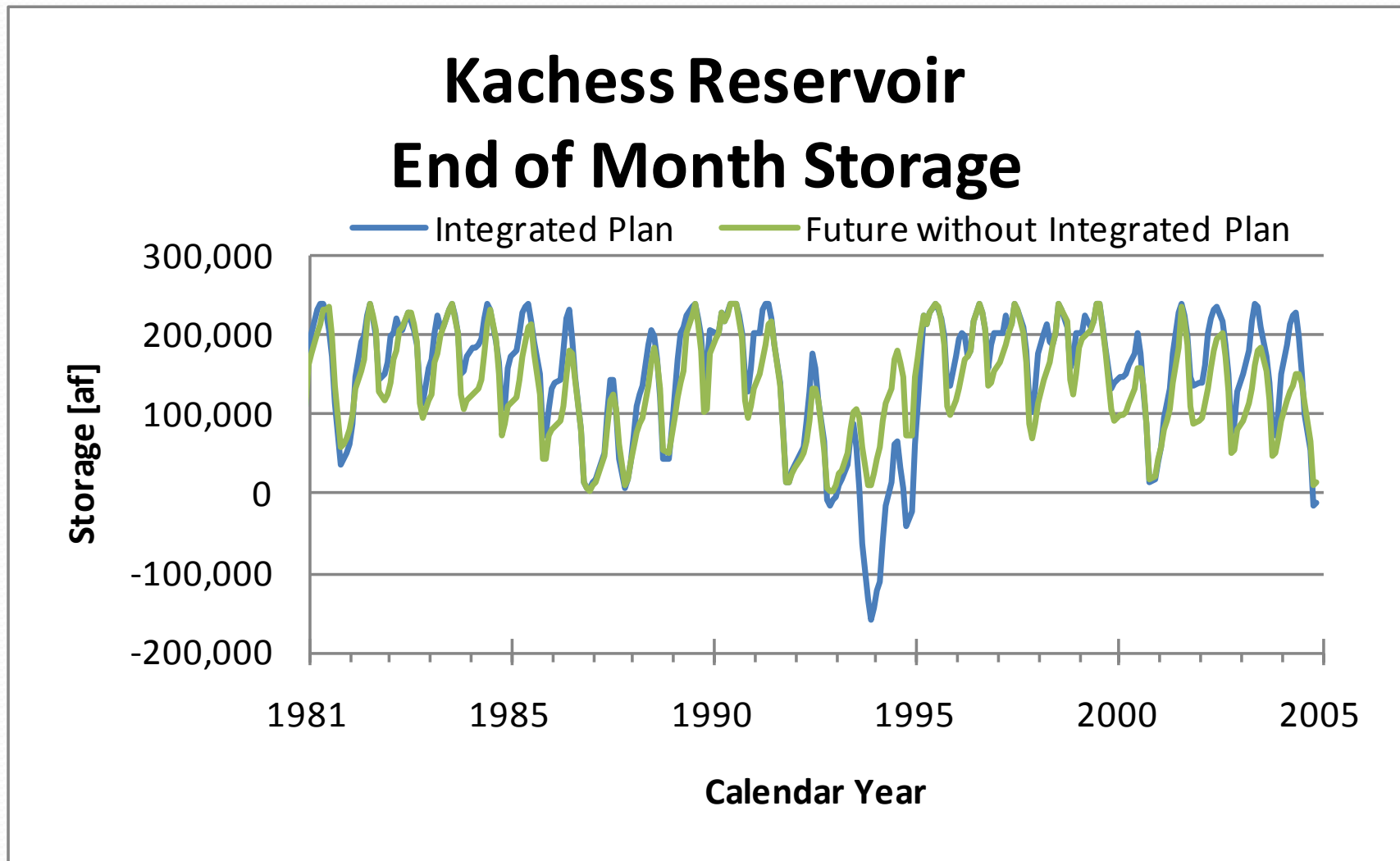
End of Month Storage: Integrated Plan



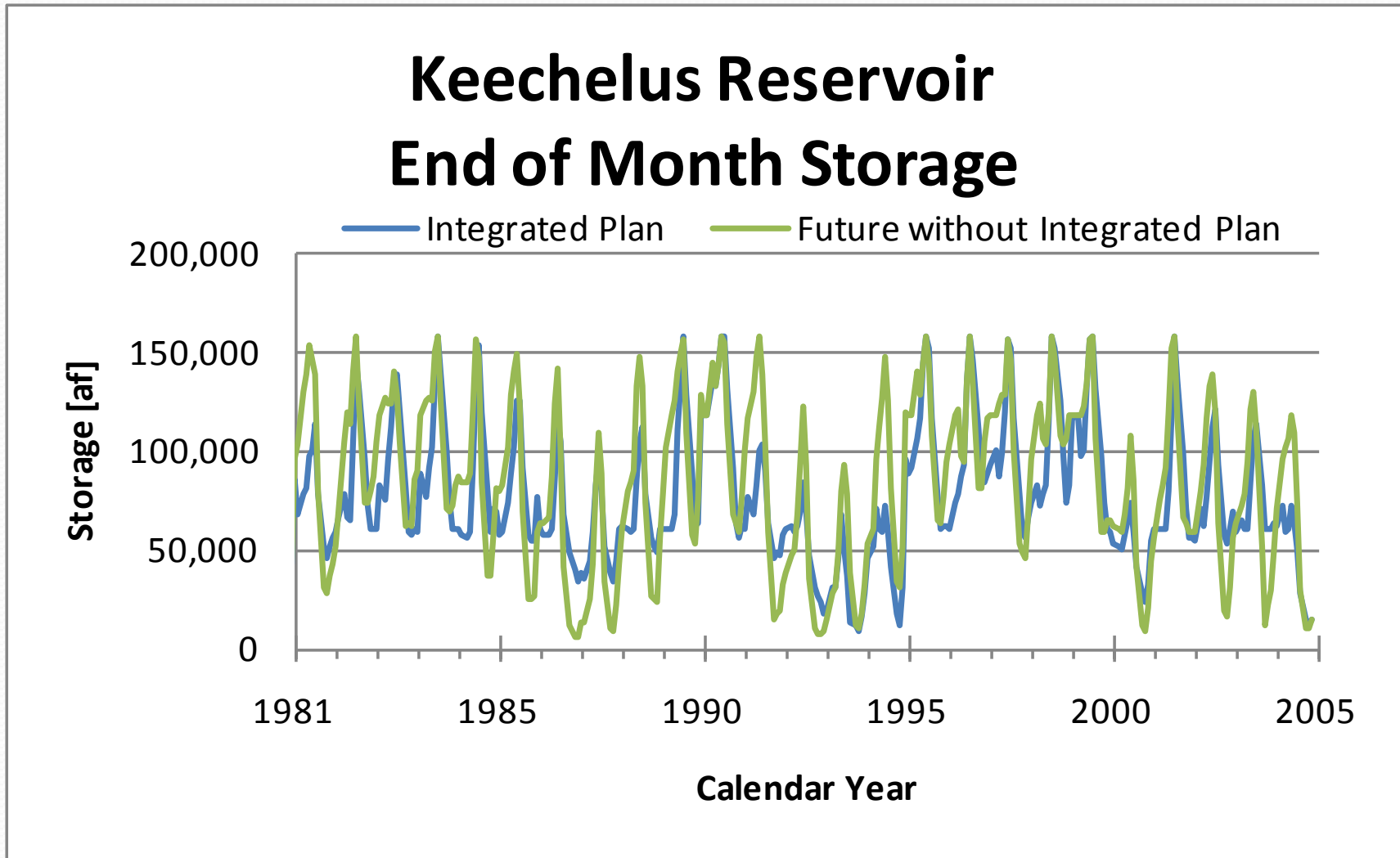
End of Month Storage: Integrated Plan



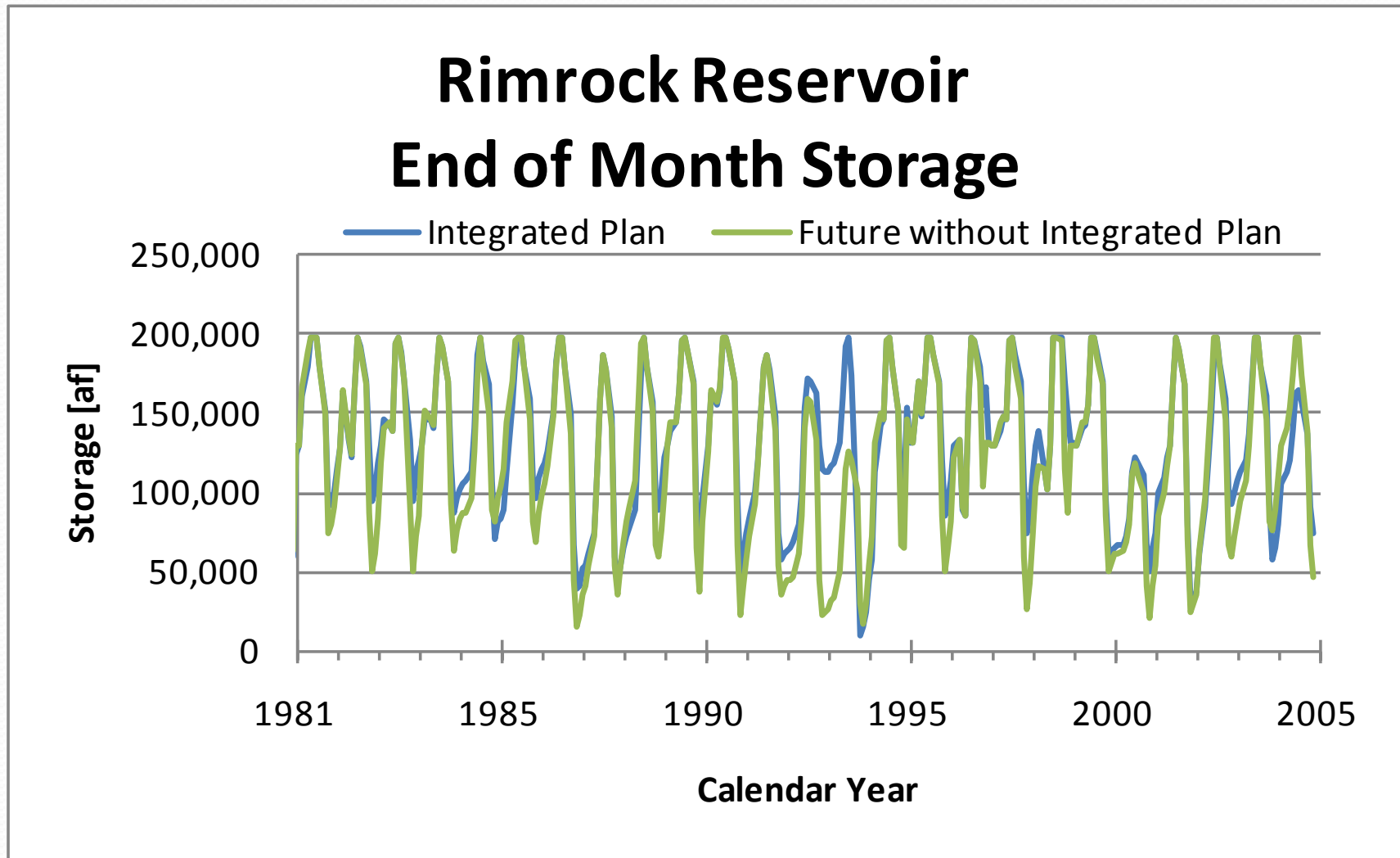
End of Month Storage: Integrated Plan



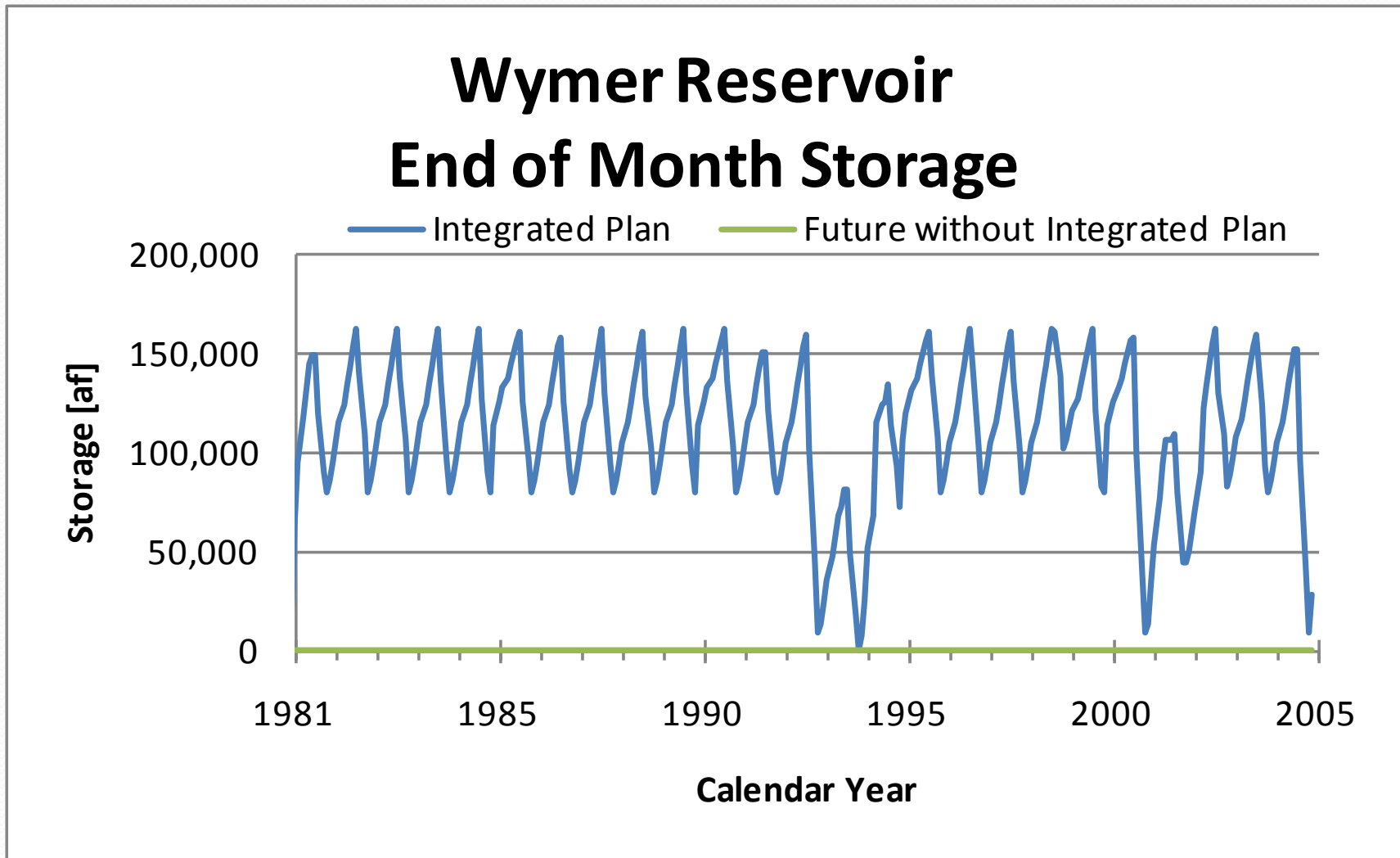
End of Month Storage: Integrated Plan



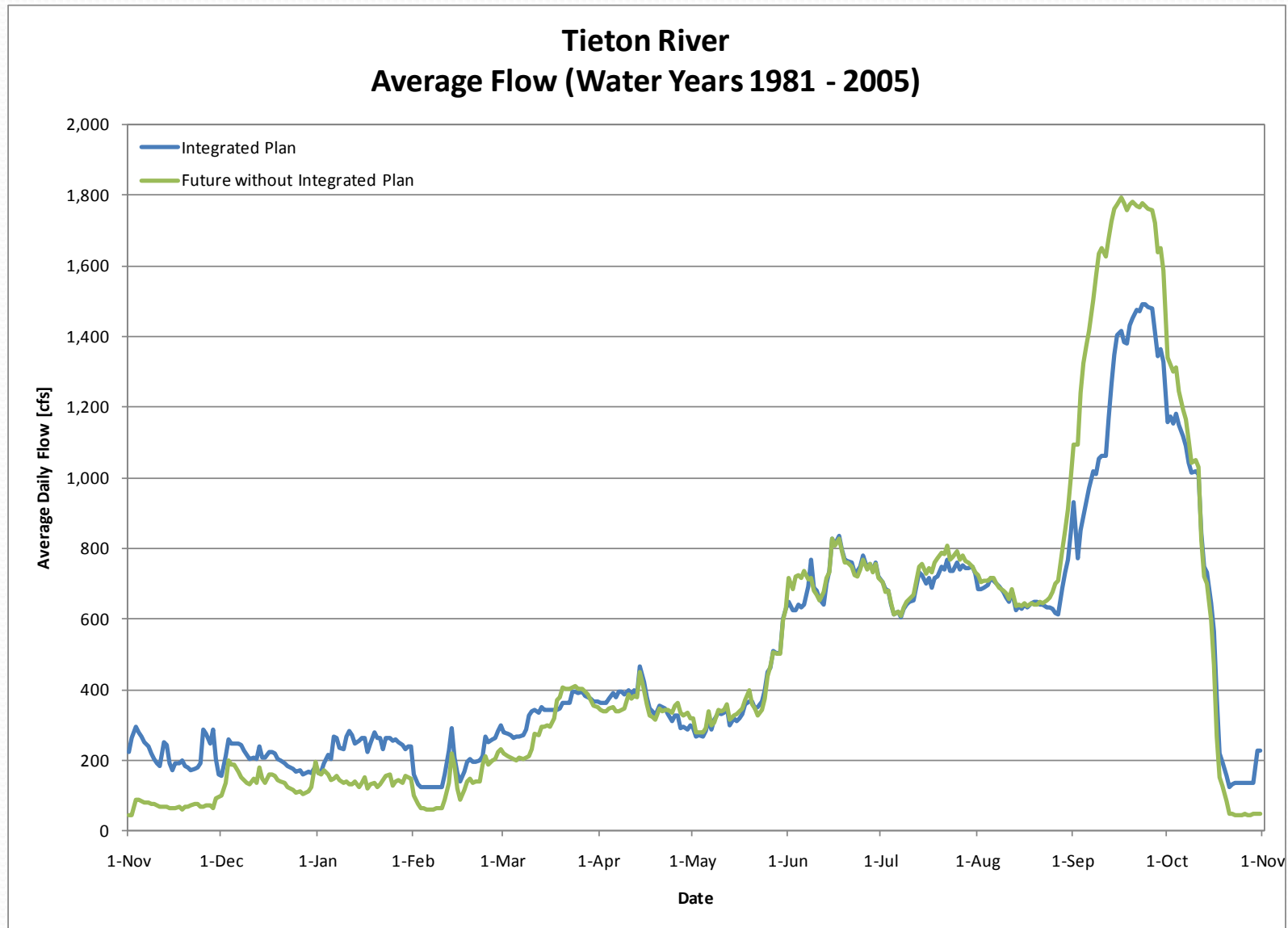
End of Month Storage: Integrated Plan



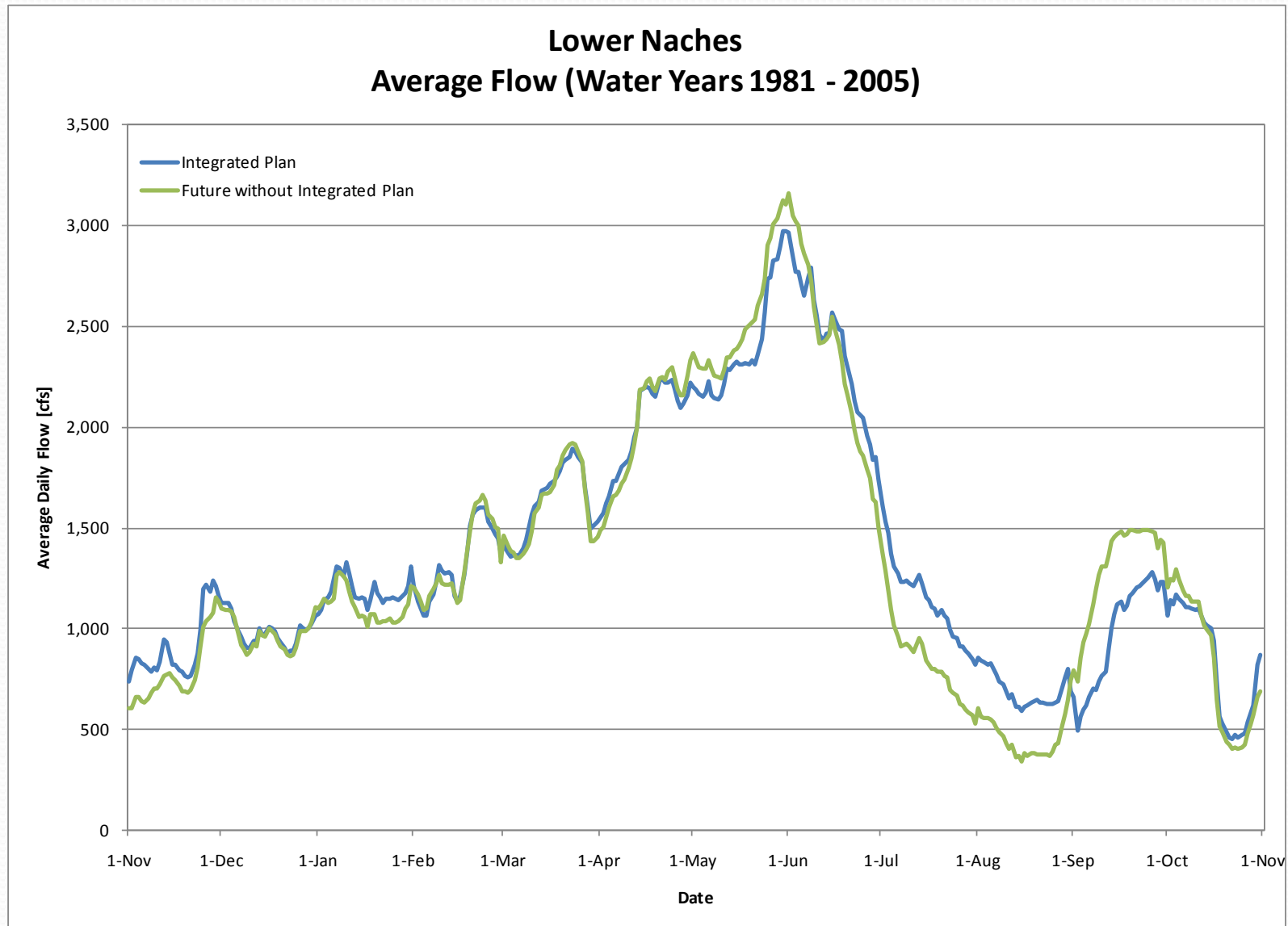
End of Month Storage: Integrated Plan



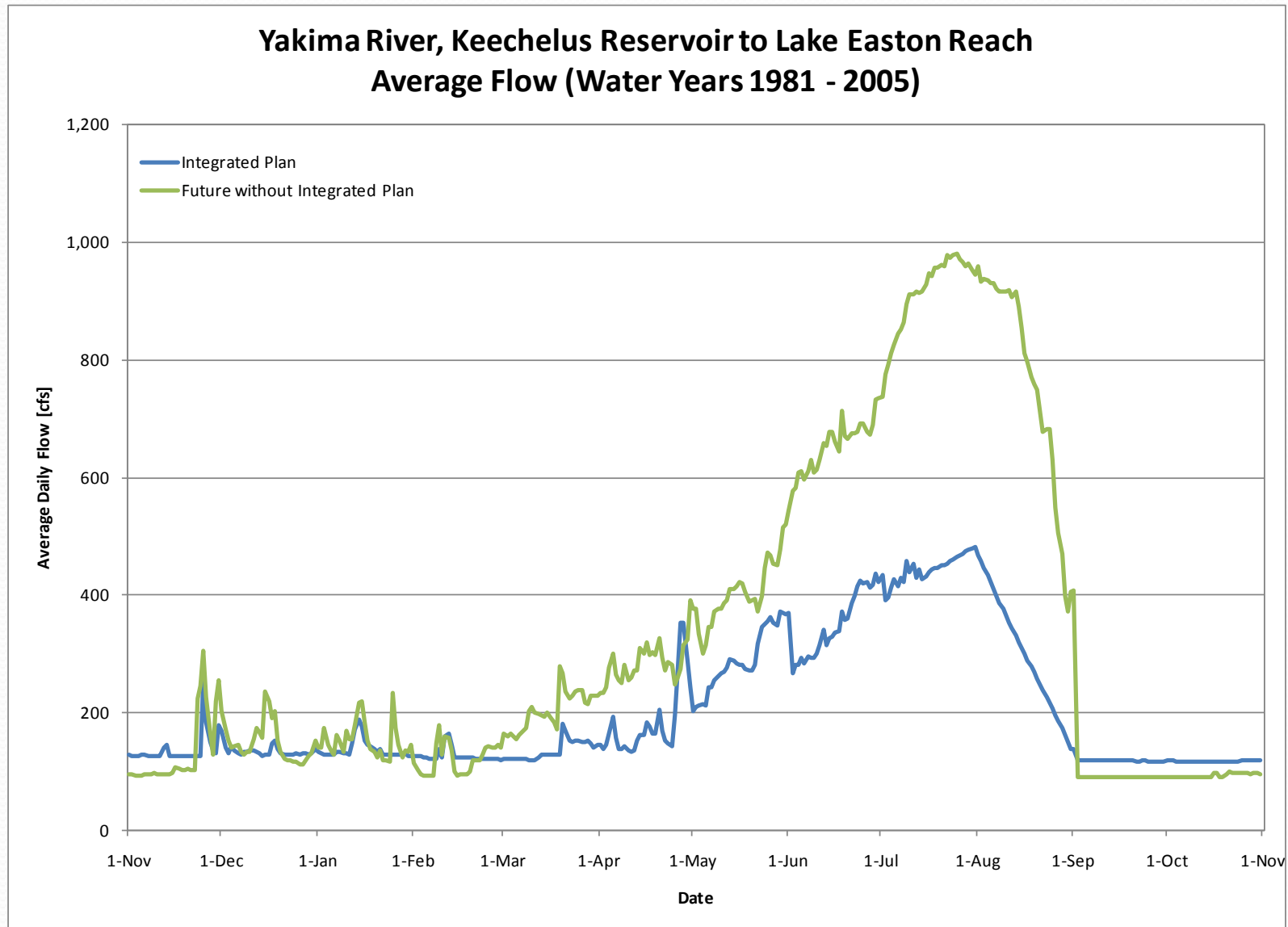
Average Hydrographs: Integrated Plan



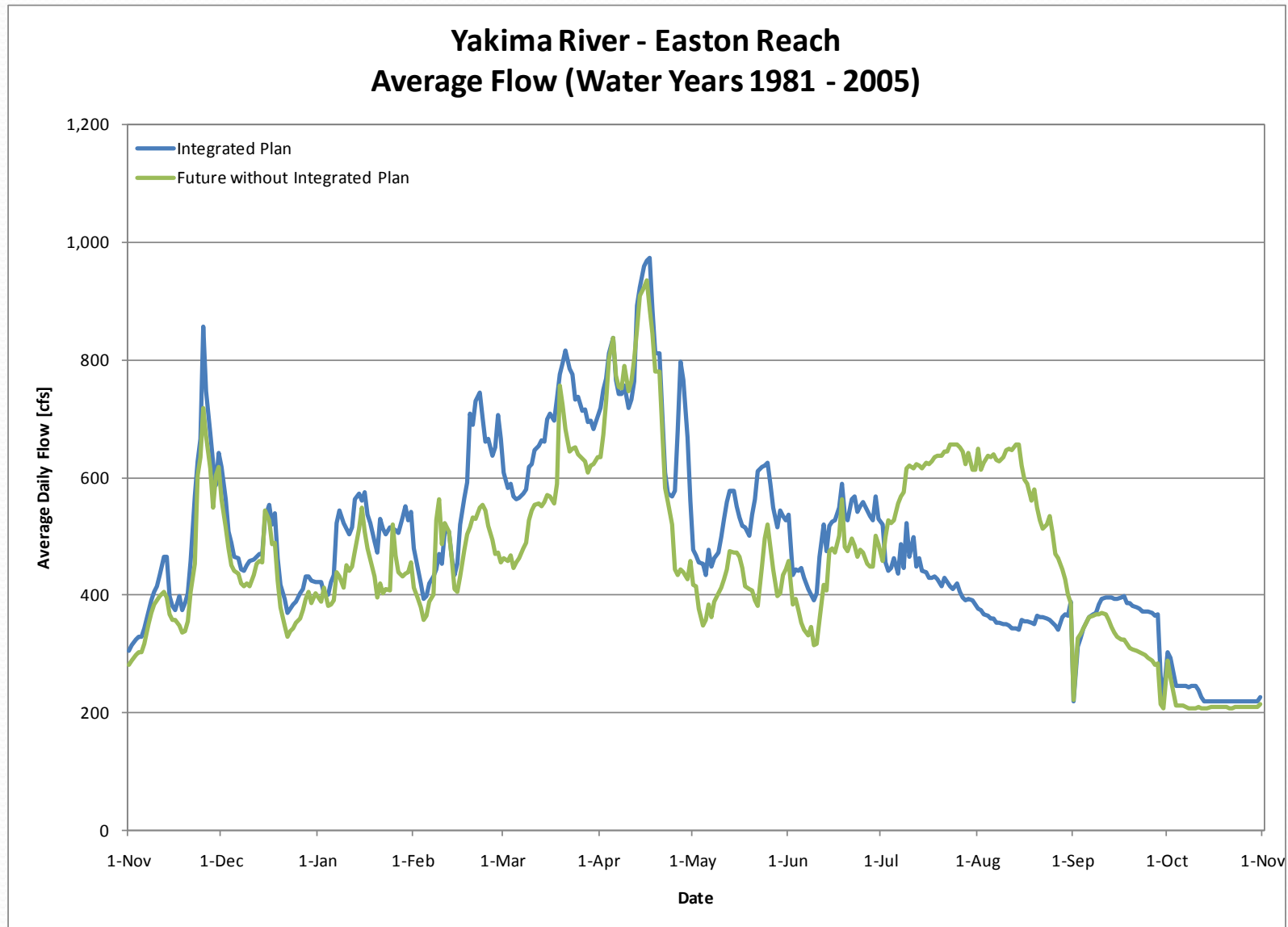
Average Hydrographs: Integrated Plan



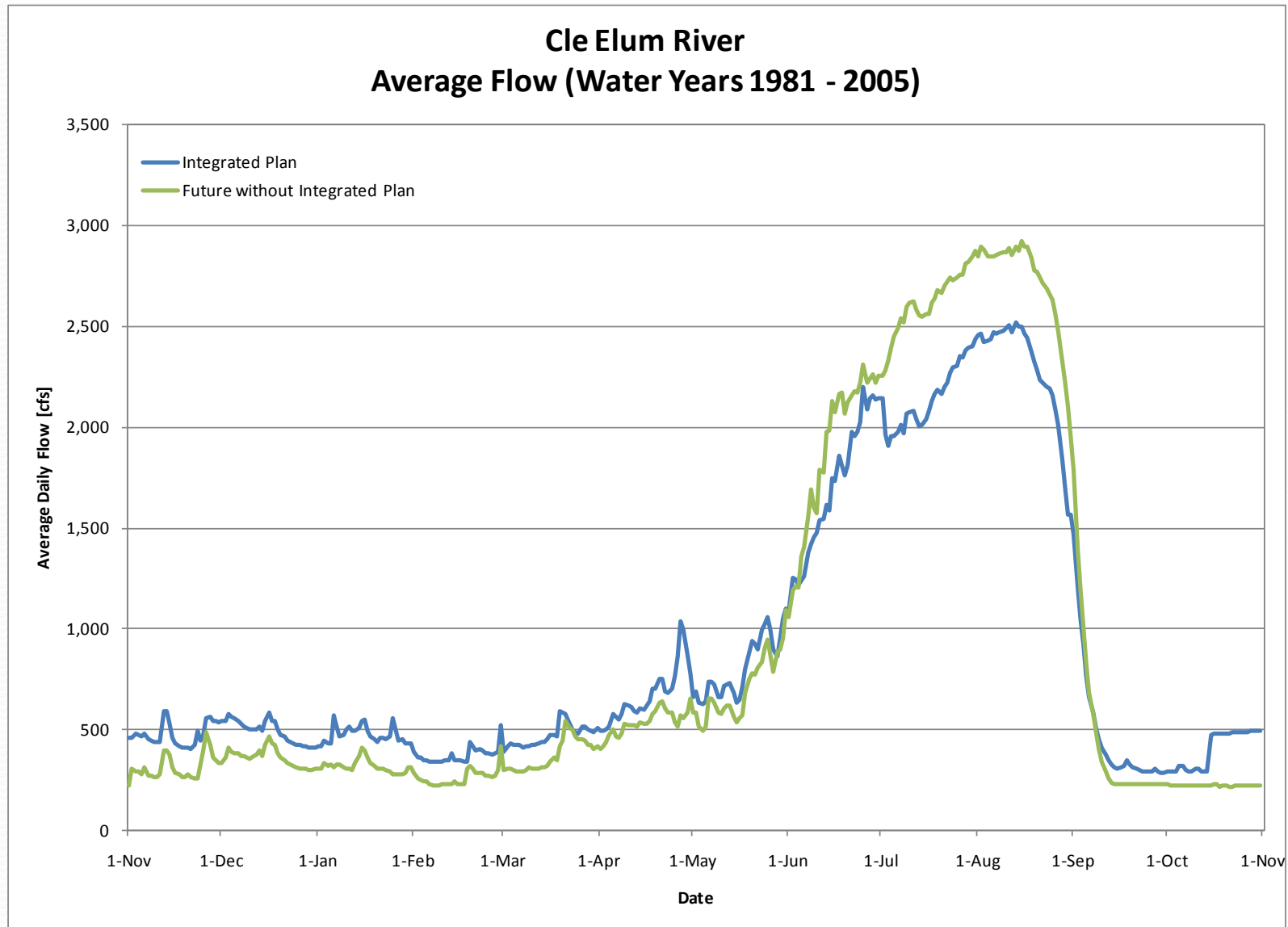
Average Hydrographs: Integrated Plan



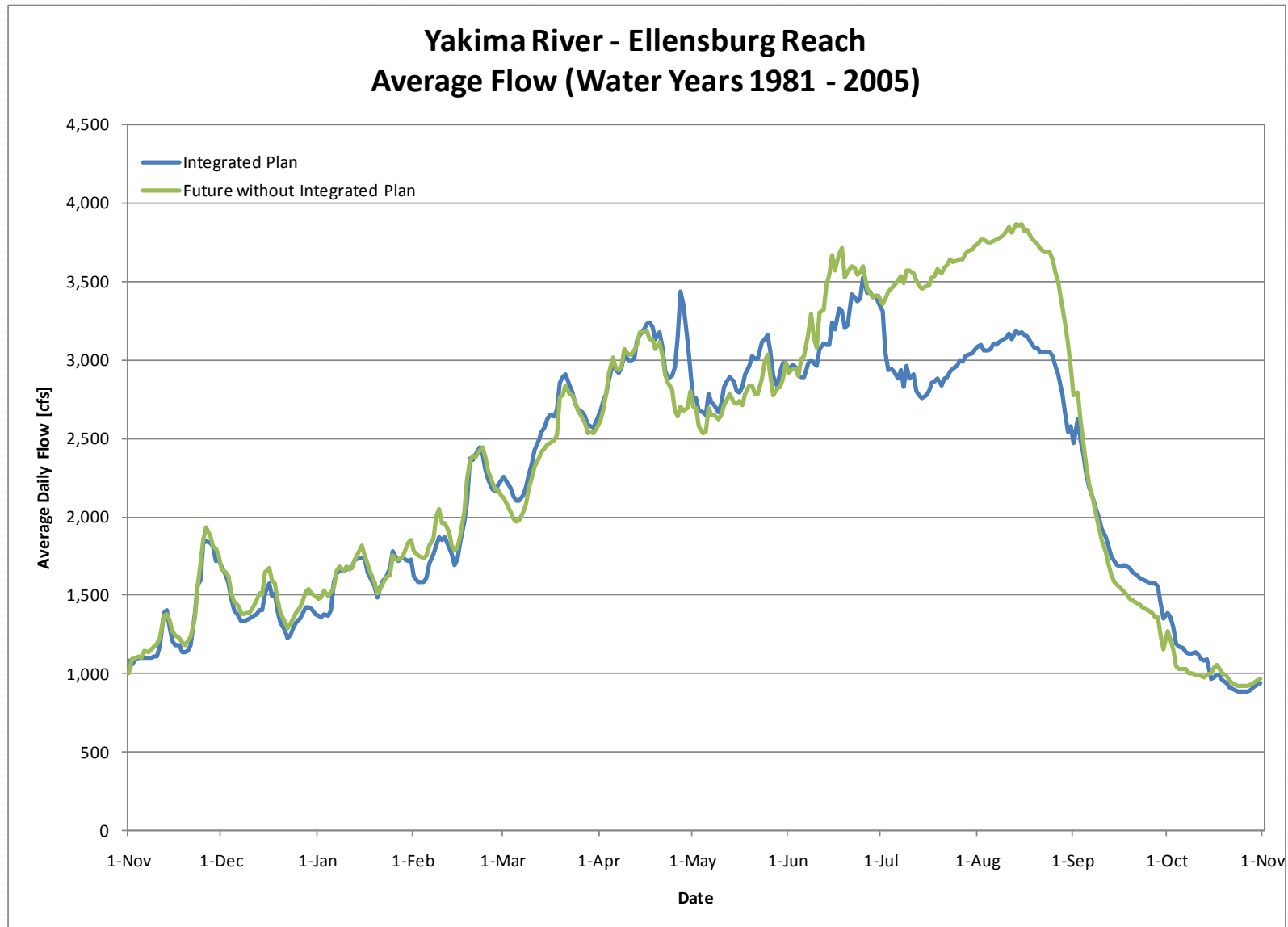
Average Hydrographs: Integrated Plan



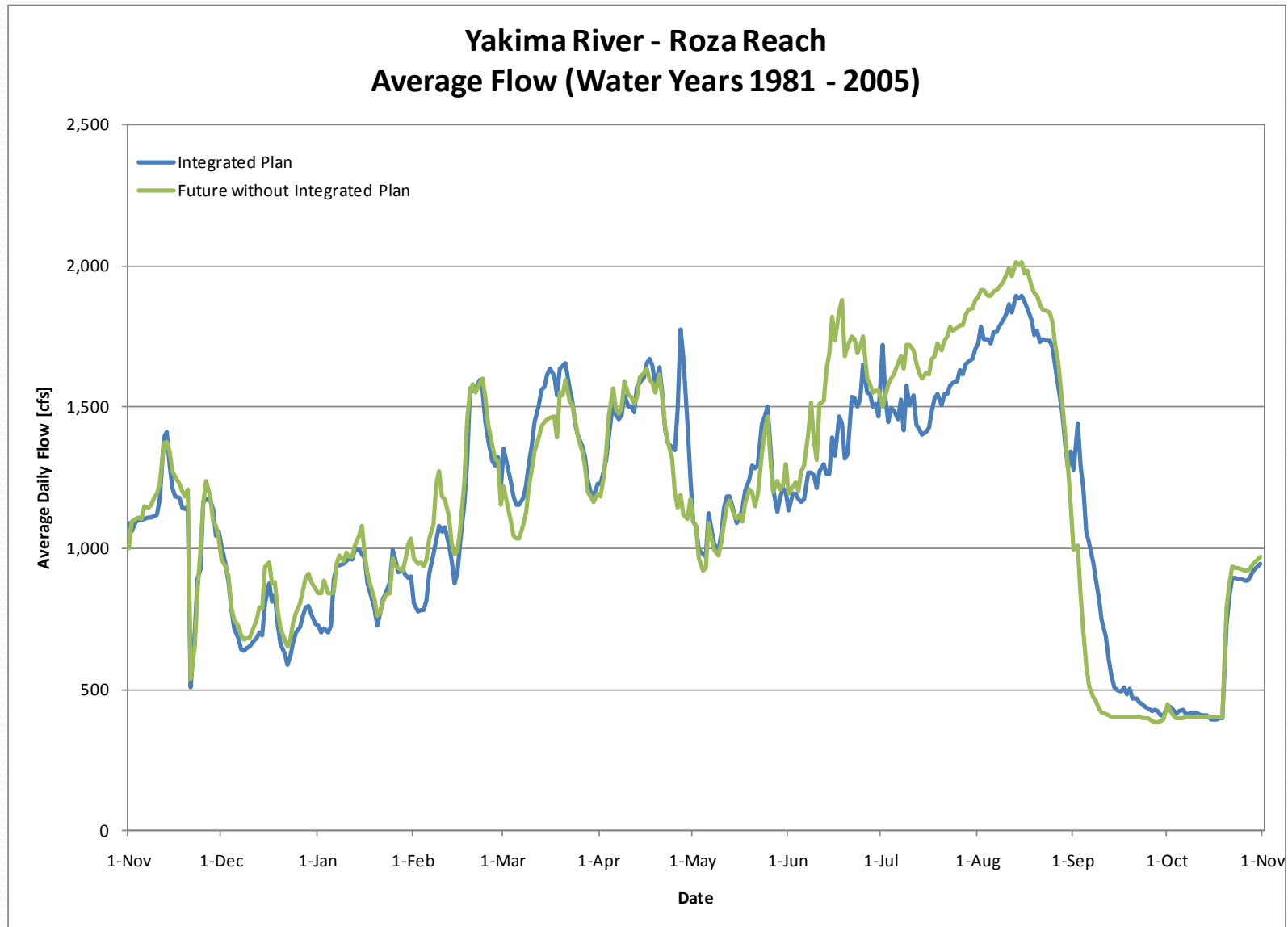
Average Hydrographs: Integrated Plan



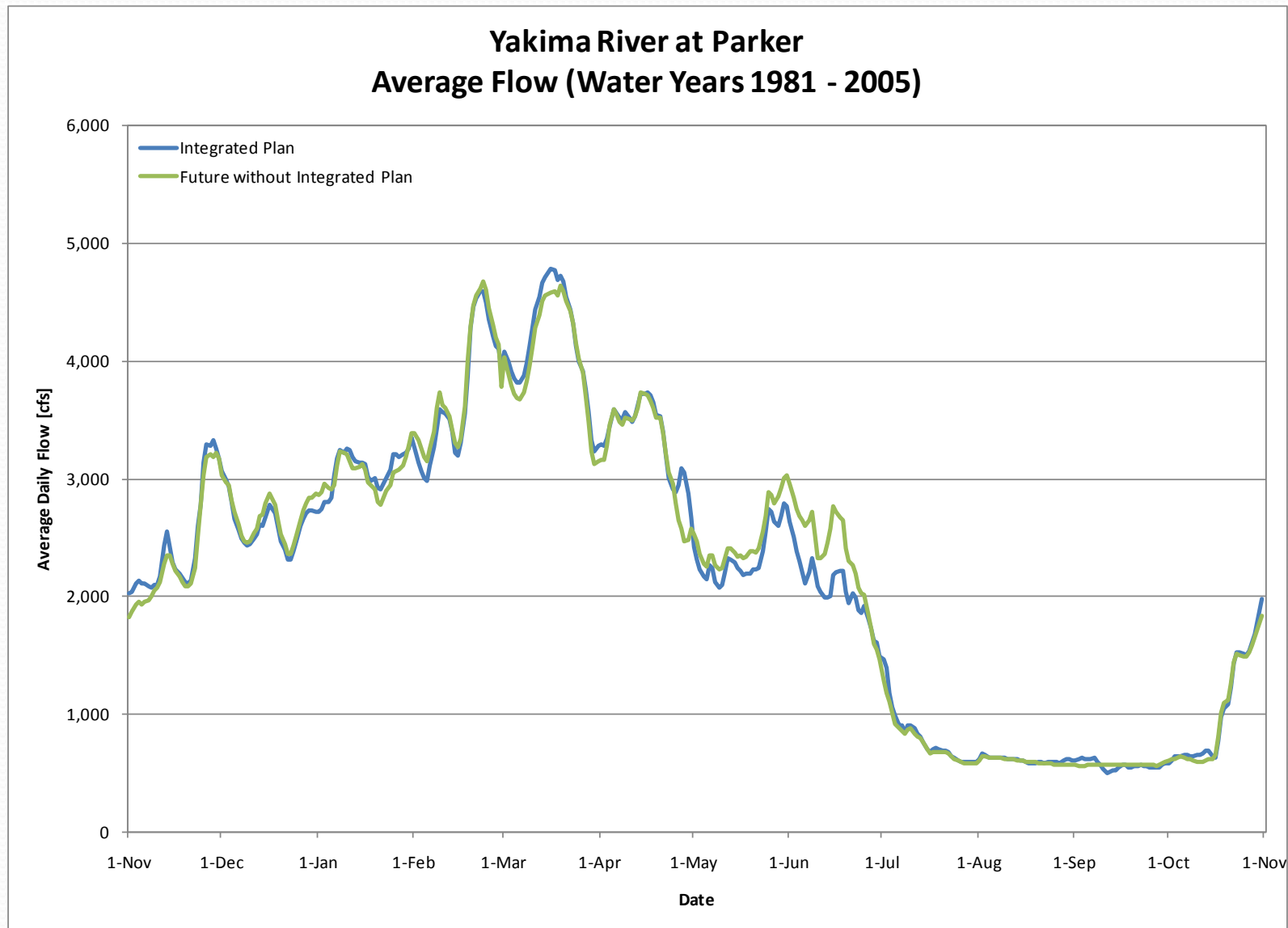
Average Hydrographs: Integrated Plan



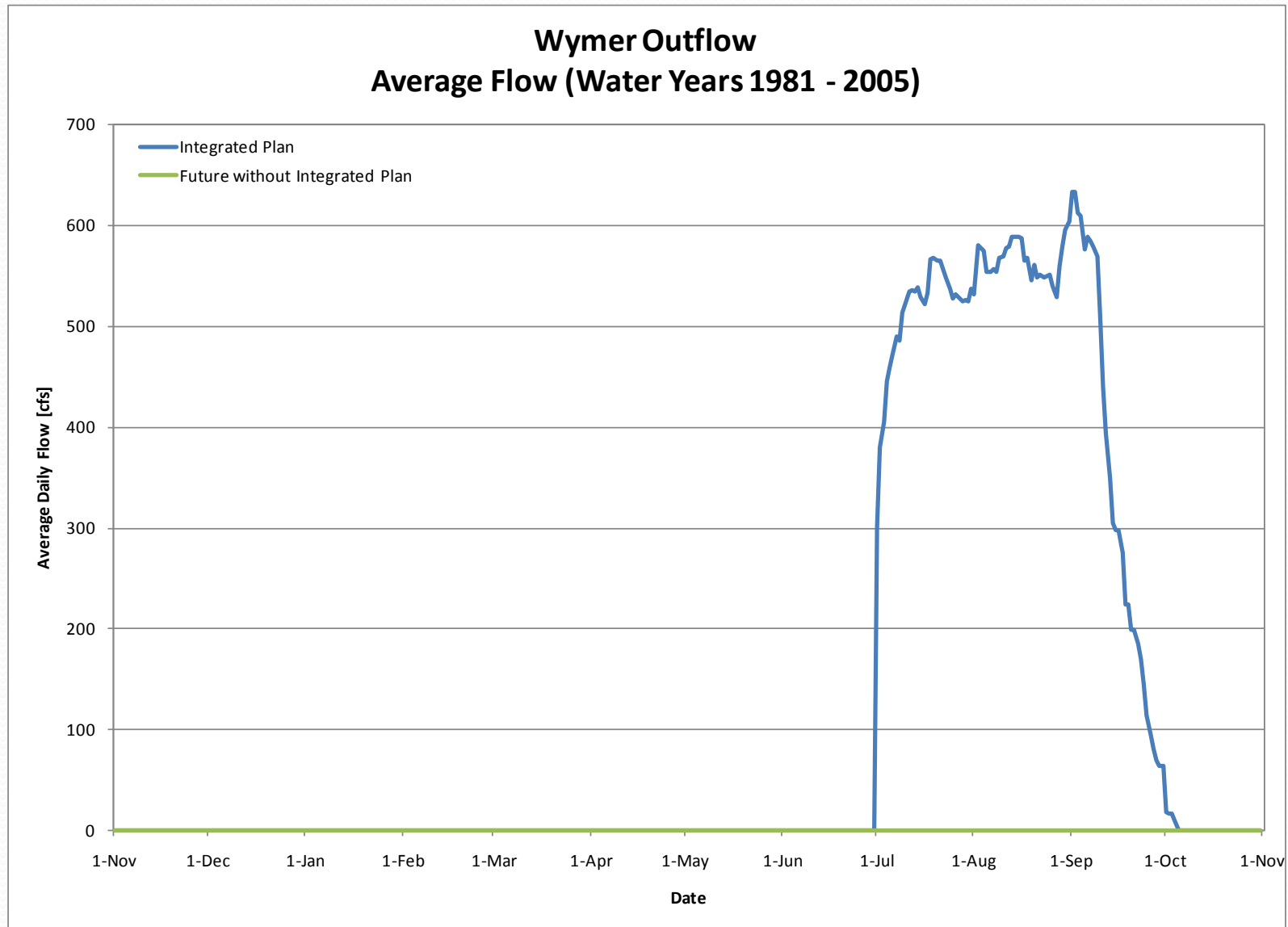
Average Hydrographs: Integrated Plan



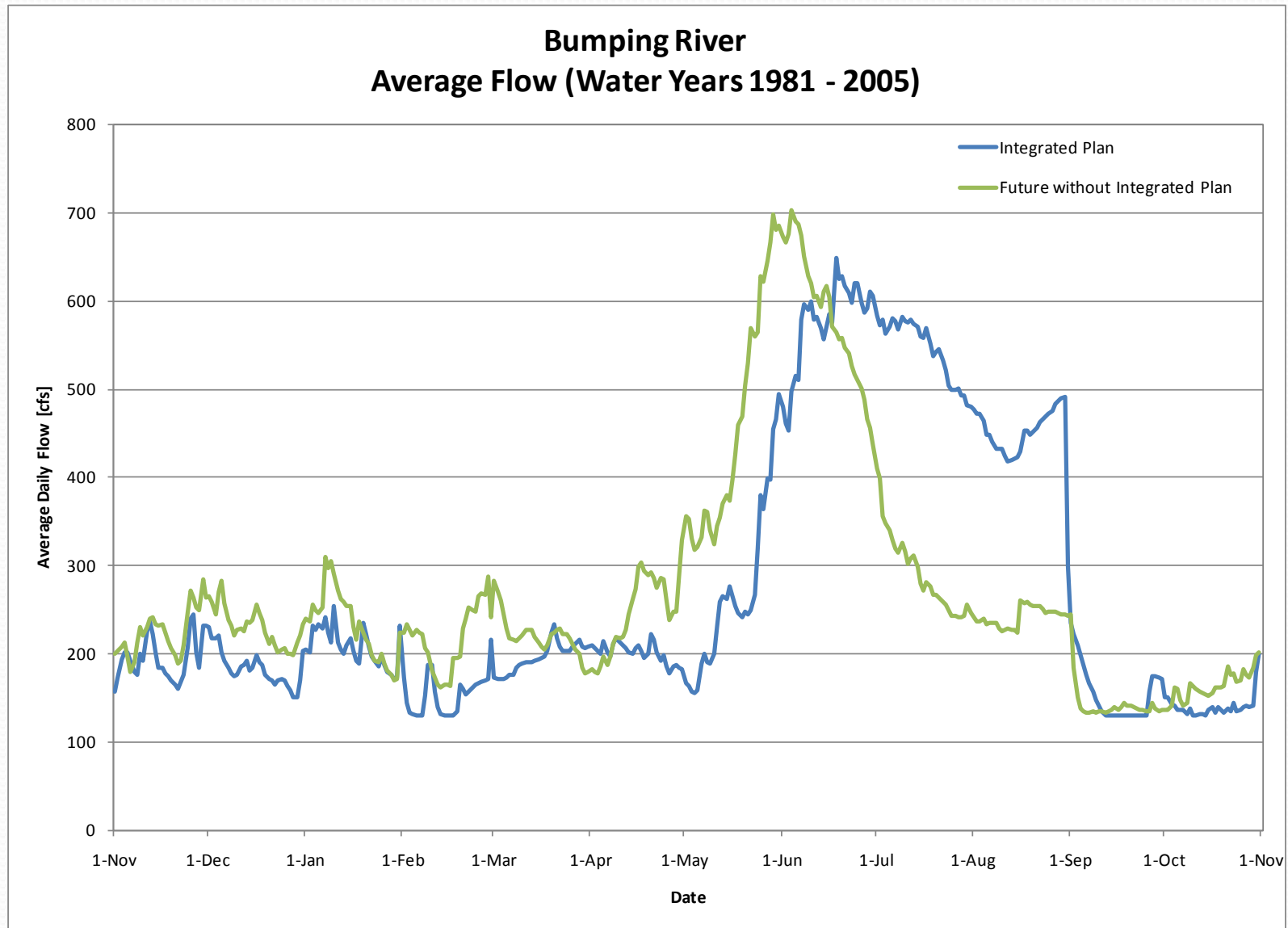
Average Hydrographs: Integrated Plan



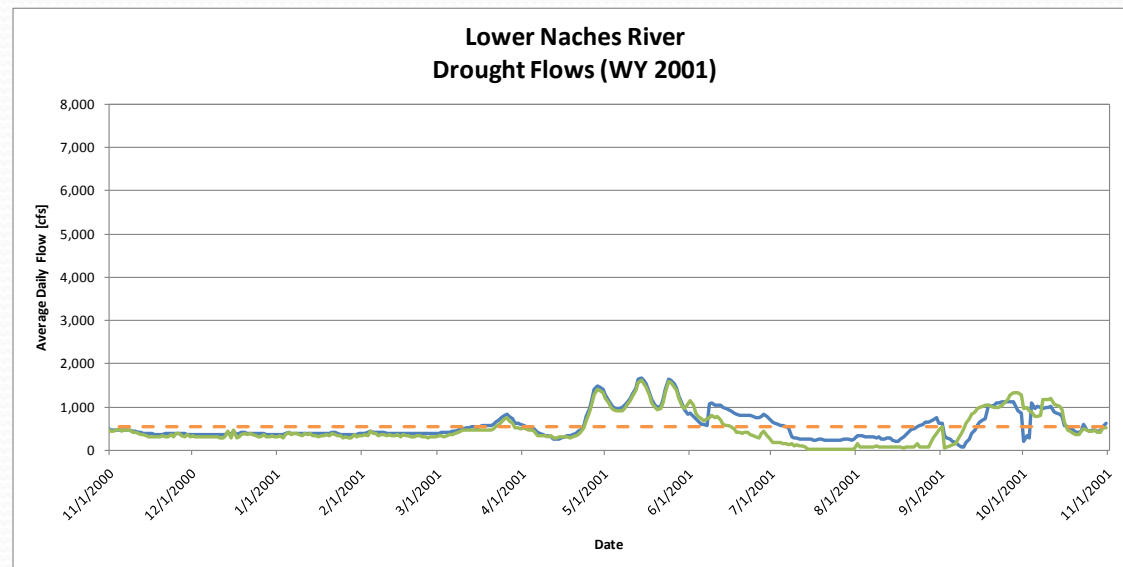
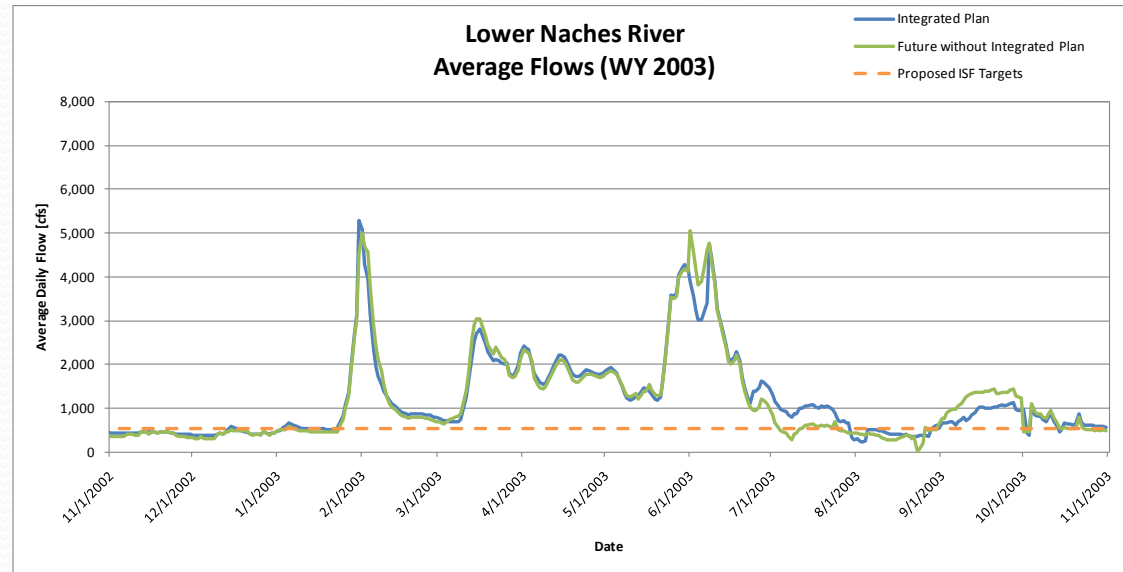
Average Hydrographs: Integrated Plan



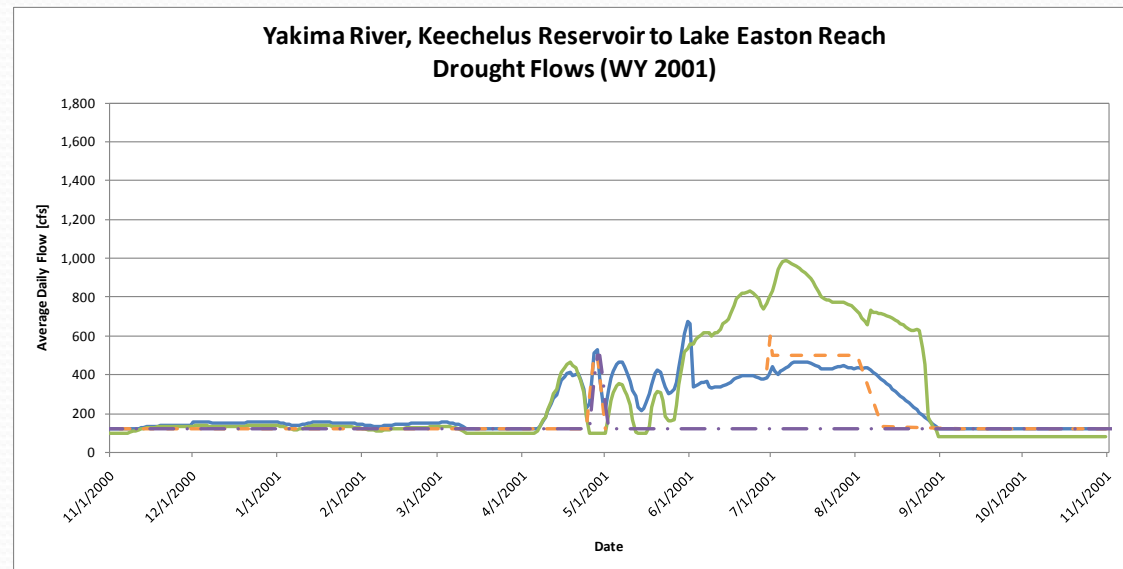
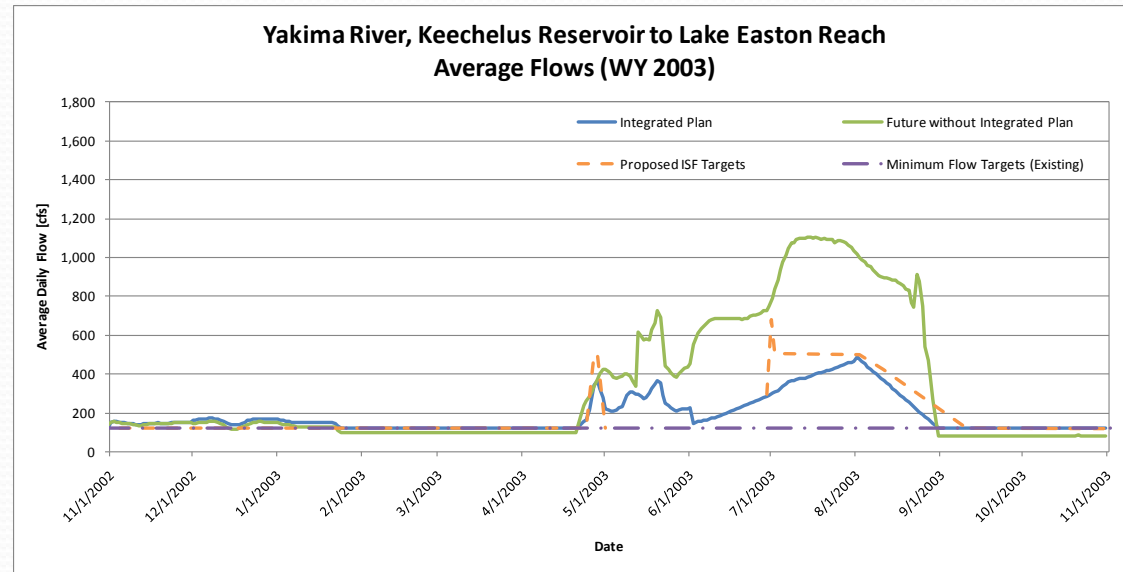
Average Hydrographs: Integrated Plan



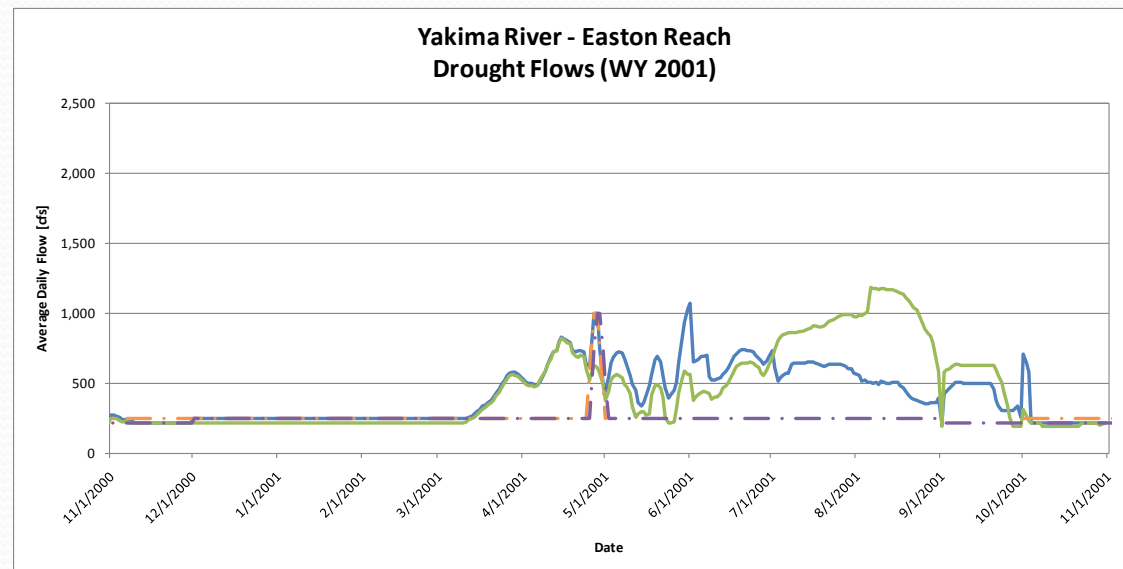
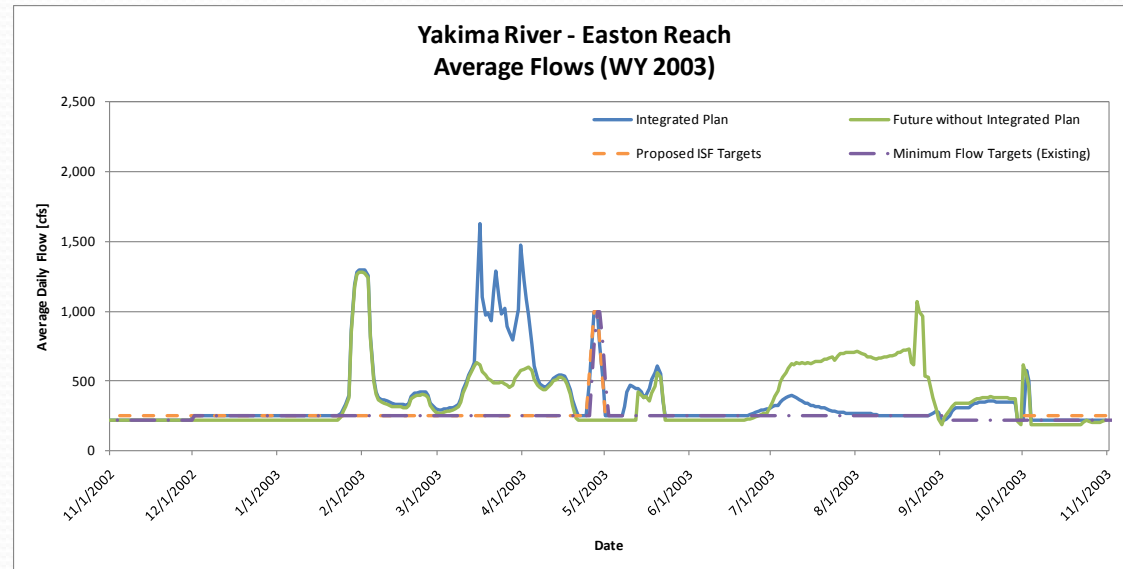
Instream Flow Charts: Integrated Plan



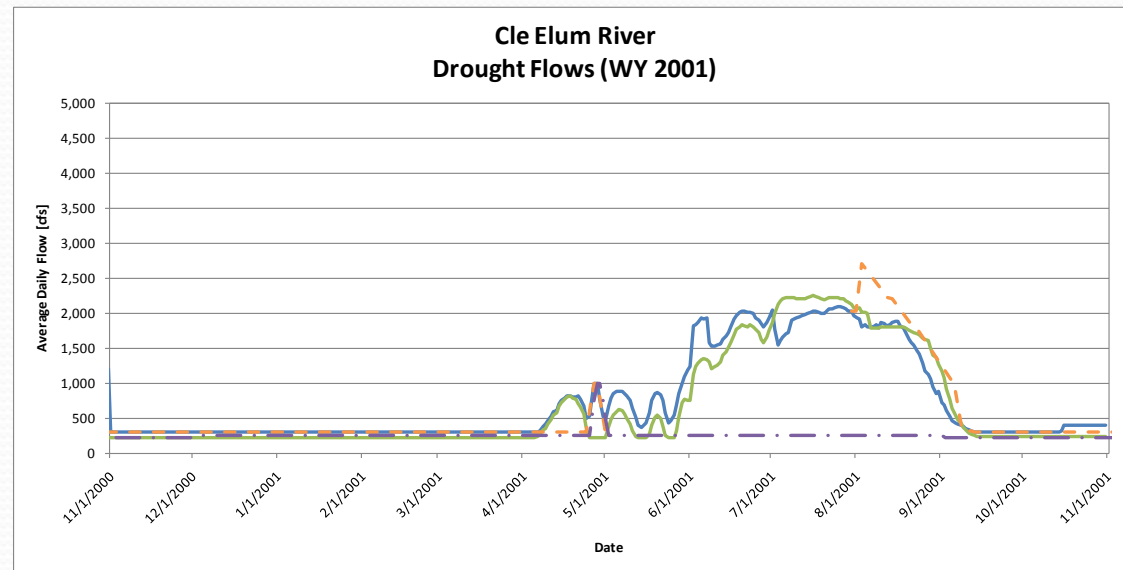
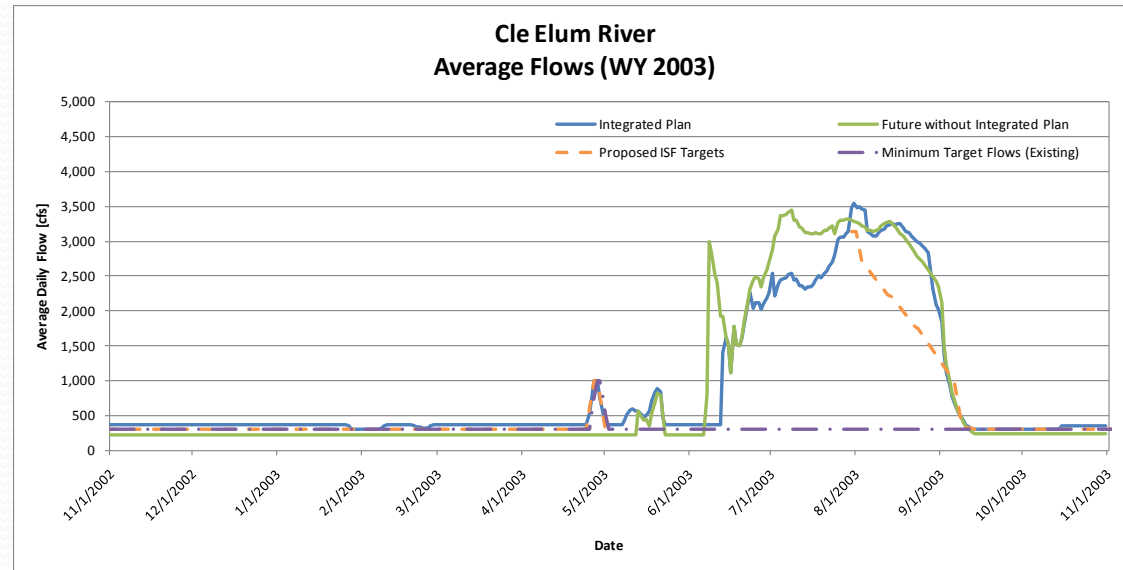
Instream Flow Charts: Integrated Plan



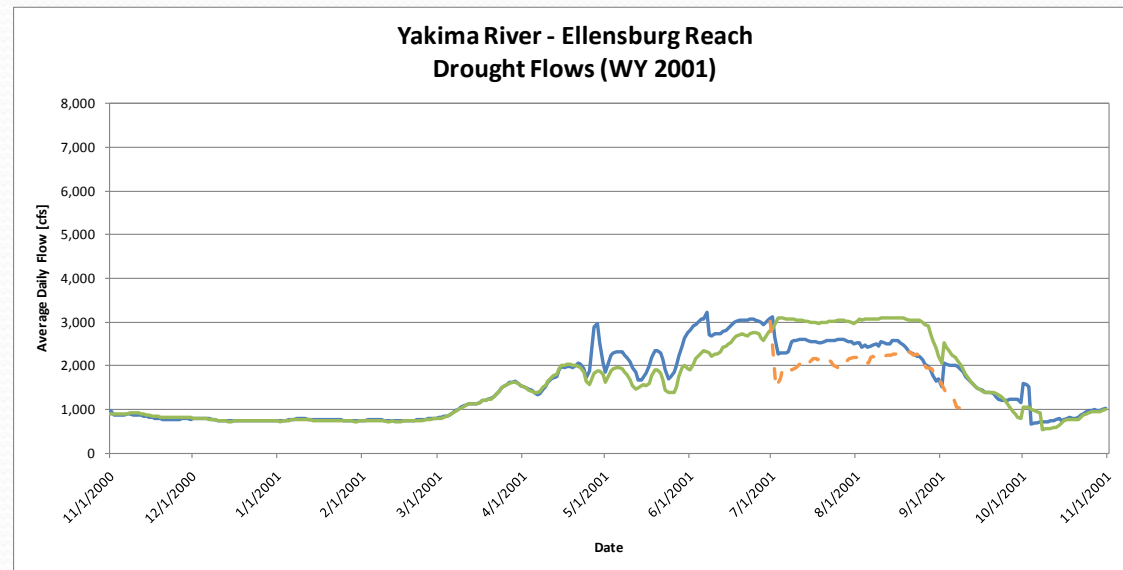
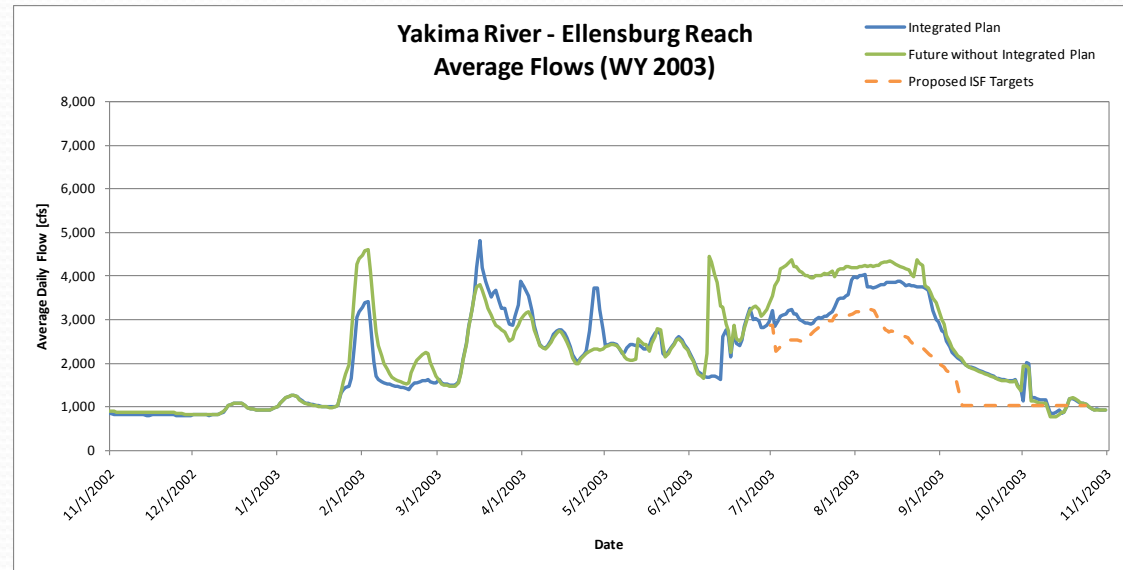
Instream Flow Charts: Integrated Plan



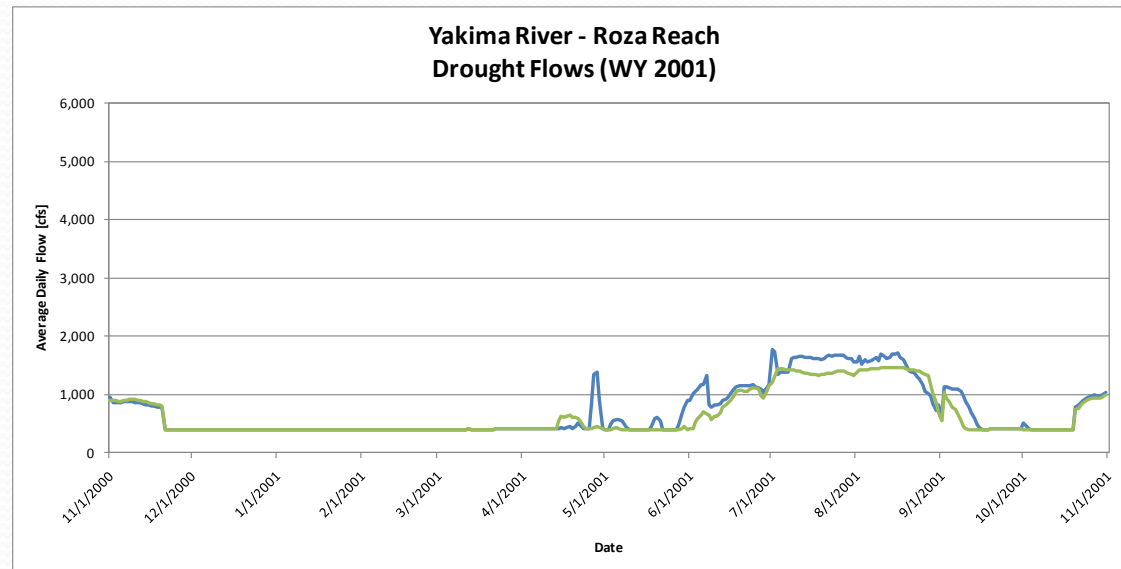
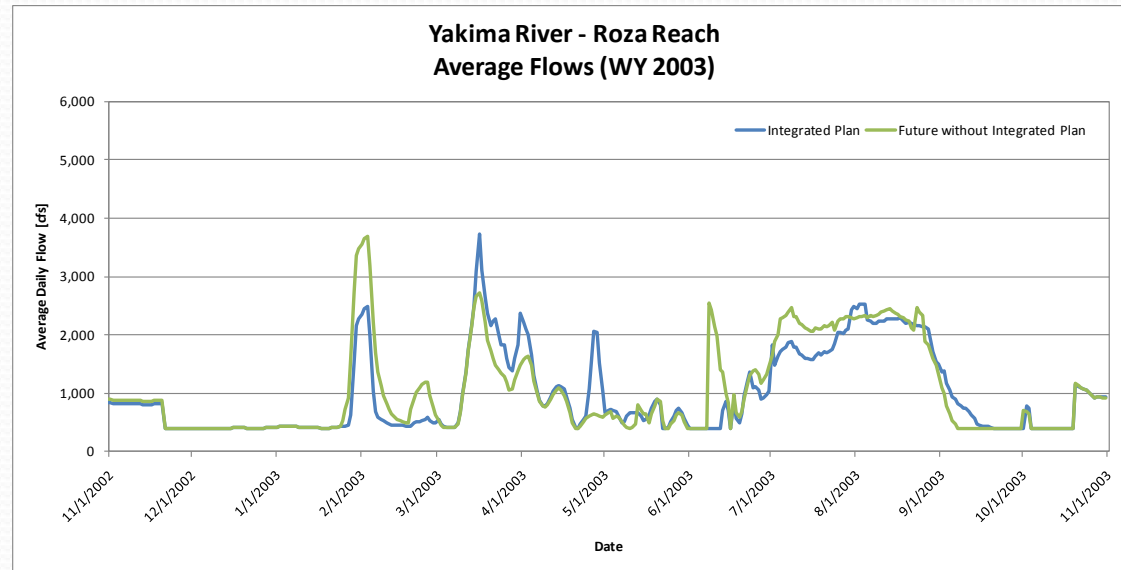
Instream Flow Charts: Integrated Plan



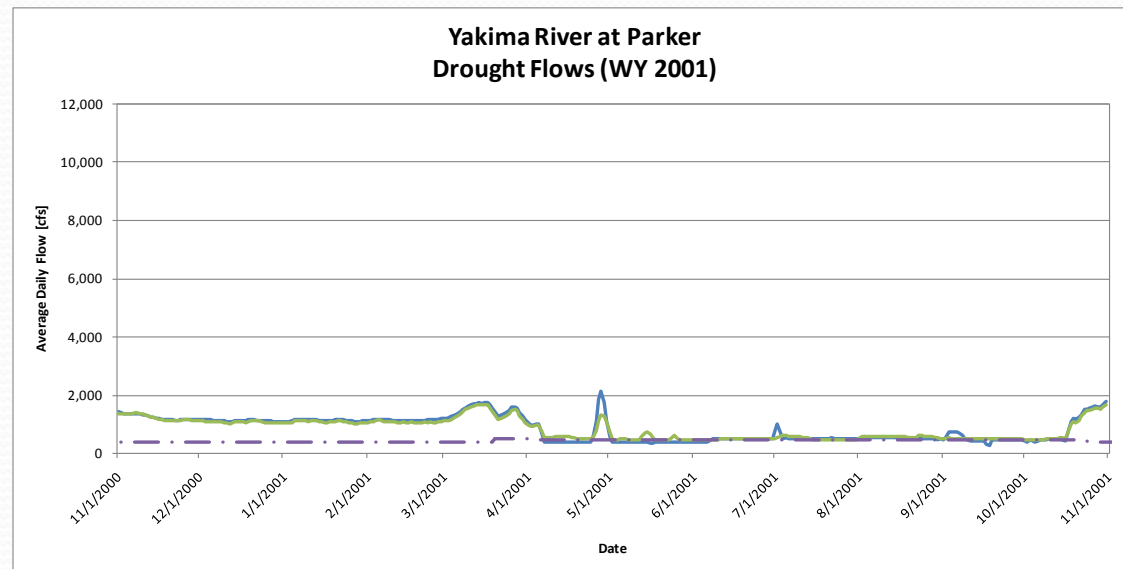
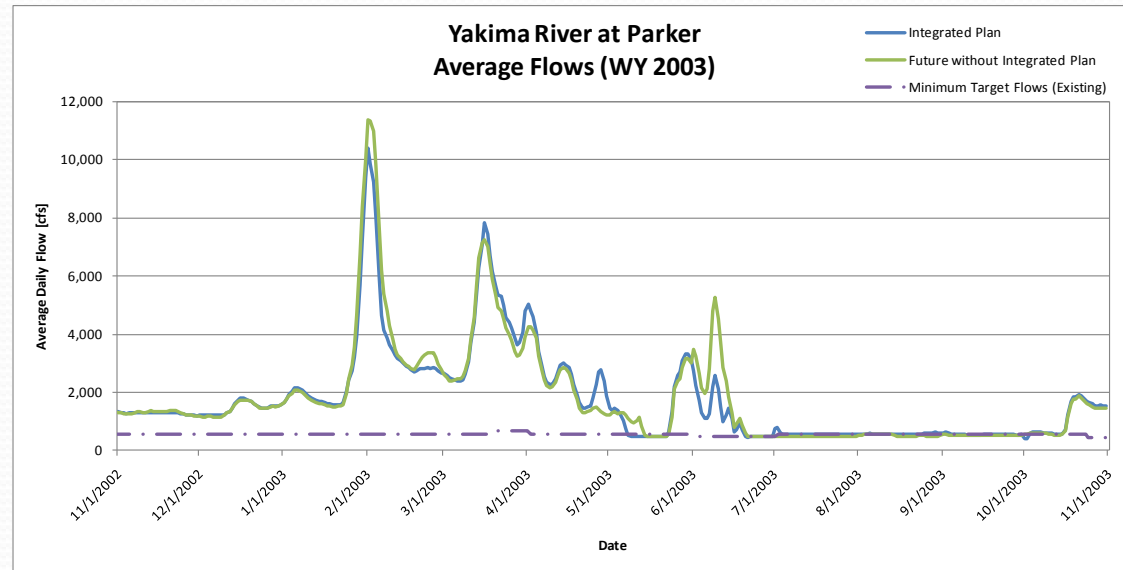
Instream Flow Charts: Integrated Plan



Instream Flow Charts: Integrated Plan



Instream Flow Charts: Integrated Plan



DSS Model Indicators

- DSS model uses 2-D hydraulic modeling for 5 floodplain reaches (Easton, Ellensburg, lower Naches River, Union Gap and Wapato) to estimate habitat areas for different flows
- Model output based upon existing river and floodplain characteristics - does not reflect increase in habitat proposed in Integrated Plan

Summary of Resource Indicators Using DSS Model

Acres of Available Habitat - Easton Reach

Resource	Time Period	Future Without Integrated Plan	Integrated Plan	% Change
Spring Chinook Fry	Mar 1-May 31	2.4	2.3	-4.4%
Spring Chinook Sub-yearling	Jun 1-Sep 30	43.9	50.7	15.4%
Steelhead Fry	Jul 1-Aug 30	3.7	4.1	10.8%
Steelhead Sub-yearling	Sep 1-Sep 30	62.4	63.4	1.7%

Summary of Resource Indicators Using DSS Model

Acres of Available Habitat - Ellensburg Reach

Resource	Time Period	Future Without Integrated Plan	Integrated Plan	% Change
Spring Chinook Fry	Mar 1-May 31	1.7	1.7	3.3%
Spring Chinook Sub-yearling	Jun 1-Sep 30	14.0	13.5	-3.3%
Steelhead Fry	Jul 1-Aug 30	2.2	2.1	-3.3%
Steelhead Sub-yearling	Sep 1-Sep 30	20.8	20.6	-0.7%

Summary of Resource Indicators Using DSS Model

Days with Levels below Bull Trout Passage Threshold

Reservoir	Future Without Integrated Plan	Integrated Plan	Change
Kachess	295	295	0
Keechelus	761	735	26
Rimrock	89	45	44

Additional Refinements

- Known Issues
- Suggestions?

Disclaimer

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- Modeling assumptions are still being refined; results will be updated

Next Steps

- Technical work to be completed in next 3 – 4 weeks
 - Sub-Committee meeting and receipt of comments
 - Further refinement of results including instream flows and other operational changes (Bumping shift)
 - Climate change 3 scenarios (2030-2059 HD scenarios):
 - “Least Effect” (cgcm3.1 t47),
 - “Middle” (hadcm), and
 - “Most Effect” (hadgem1)
 - Technical memo
- Additional results presented at the 10/27 Workgroup mtg.