Water Demand Estimates
for planning purposes as displayed in
Yakima River Basin Water Storage Feasibility Study PR/EIS

Instream Flows

Feedback received: Review individual reaches and issues by season to develop need in wet, average, dry years. Evaluate instream and off-channel needs for species and life stage.
Suggested refinements: Start with "Flow Priority Matrix" from December 2, 2006, meeting with biologists.
Objective: Prioritization of important Yakima basin stream reaches by water year condition (dry, average, wet). Generally presents foundation we can work from; refine as needed.

Monthly flow objectives (cfs) and volumes (acre-feet) for an average water year for the Easton reach; Cle Elum River; and Ellensburg, Wapato, and lower Naches River reaches

(source: *Final Planning Report/Environmental Impact Statement, Volume 1, Yakima River Basin Water Storage Feasibility Study*; pg 2-4)

Reach		Spring				Summer				Winter			
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Easton	Flow objective (cfs)	722	1,166	1,400	787	450	375	375	375	425	450	450	450
	Volume (acre-feet)	42,943	69,406	83,300	46,856	26,775	22,313	22,313	22,313	25,288	26,775	26,775	26,775
Cle Elum River	Flow objective (cfs)	511	954	1,500	1,301	589	400	400	400	425	425	425	425
	Volume (acre-feet)	30,432	56,777	89,250	77,391	35,061	23,800	23,800	23,800	25,288	25,288	25,288	25,288
Ellens-burg	Flow objective (cfs)	1,982	2,424	3,700	2,586	2,000	1,000	1,000	1,000	980	1,016	1,257	1,459
	Volume (acre-feet)	117,938	144,238	220,150	153,849	119,000	59,500	59,500	59,500	58,311	60,446	74,807	86,821
Wapato	Flow objective (cfs)	3,109	2,794	3,500	2,655	1,300	1,300	1,300	1,300	1,758	1,854	2,163	2,460
	Volume (acre-feet)	184,978	166,261	208,250	157,958	77,350	77,350	77,350	77,350	104,616	110,295	128,712	146,389
Lower Naches River	Flow objective (cfs)	1,265	1,802	2,297	2,291	988	550	550	550	500	576	691	720
	Volume (acre-feet)	75,296	107,194	136,682	136,307	58,772	32,725	32,725	32,725	29,779	34,290	41,112	42,834

Title XII target flows

(source: *Final Planning Report/Environmental Impact Statement, Volume 1, Yakima River Basin Water Storage Feasibility Study*; pg 2-3)

TWSA estimate for period of April–September (maf)					Target flow from date of estimate through October downstream from:	
Scenario	Apr–Sep	May–Sep	Jun–Sep	Jul–Sep	Sunnyside Diversion Dam (cfs)	Prosser Diversion Dam (cfs)
1	3.20	2.90	2.40	1.90	600	600
2	2.90	2.65	2.20	1.70	500	500
3	2.65	2.40	2.00	1.50	400	400
Less than scenario 3 water supply					300	300

Reach Instream Flow Priority Matrix

(source: December 2, 2006 meeting with Yakima basin biologists)

	Dry Water Year (TWSA <2,500 KAF)				Average Water Year (TWSA >=2,500 to <3,250 KAF)				Wet Water Year (TWSA >3,250 KAF)			
Reach	**spring (apr-jun)**	**summer (jul-sep)**	**fall (oct-dec)**	**winter (jan-mar)**	**spring (apr-jun)**	**summer (jul-sep)**	**fall (oct-dec)**	**winter (jan-mar)**	**spring (apr-jun)**	**summer (jul-sep)**	**fall (oct-dec)**	**winter (jan-mar)**
Easton	Flow increase with flow variation with respect to natural events, for smolts.	Reduce summer Qs without dewatering side.channels.	increase overwintering habitat for juveniles and to protect redds	increase overwintering habitat for juveniles and to protect redds	Flow increase with flow variation wrt natural events, for smolts.	Reduce summer Qs without dewatering side channel.	125	increase overwintering habitat for juveniles and to protect redds	Flow increase with flow variation wrt natural events, for smolts.	Reduce summer Qs without dewatering s.c.	increase overwintering habitat for juveniles and to protect redds	increase overwintering habitat for juveniles and to protect redds
Cle Elum	proctect redds and emergent fry	reduce summer Qs; flip flop & insect food base impact	increase winter Qs - which will further reduce flip flop differential.	increase winter Qs - which will further reduce flip flop differential.	proctect redds and emergent fry	reduce summer Qs; flip flop & insect food base impact	increase winter Qs - which will further reduce flip flop differential.	increase winter Qs - which will further reduce flip flop differential.	proctect redds and emergent fry	reduce summer Qs; flip flop & insect food base impact	increase winter Qs - which will further reduce flip flop differential.	increase winter Qs - which will further reduce flip flop differential.
Cle Elum River	increase flow variability- may jun	reduce summer Qs	300-400 Qs with natural variation	300-400 Qs with natural variation	increase flow variability- may jun	reduce summer Qs	300-400 Q with natural variation	300-400 Qs with natural variation	increase flow variability- may jun	reduce summer Qs	300-400 Qs with natural variation	300-400 Q with natural variation
Ellensburg	increase Q for smolts; roza dam passage	reduce summer Qs; flip flop & insect food base impact	increase winter Qs - which will further reduce flip flop differential.	increase winter Qs - which will further reduce flip flop differential.	increase Q for smolts; roza dam passage	reduce summer Qs; flip flop & insect food base impact	increase winter Qs - which will further reduce flip flop differential.	increase winter Qs - which will further reduce flip flop differential.	increase Q for smolts; roza dam passage	reduce summer Qs; flip flop & insect food base impact	increase winter Qs - which will further reduce flip flop differential.	increase winter Qs - which will further reduce flip flop differential.
Roza to Naches	ok, allow some of the natural flow to stay in the river and not be used for recharge of canals	maintain spring Qs w/ natural variation	reduce Qs in early Oct for spring chinook spawning; probably close to ok. John-water flowing along the bank.	more/less ok	ok, allow some of the natural flow to stay in the river and not be used for recharge of canals	maintain spring Qs w/ natural variation	reduce Q in early Oct for spring chinook spawning; probably close to ok. John-water flowing along the bank	more/less ok	ok, allow some of the natural flow to stay in the river and not be used for recharge of canals	maintain spring Qs w/ natural variation	reduce Qs in early Oct for spring Chinook spawning; probably close to ok. John-water flowing along the bank	more/less ok
Union Gap	increased spring flow for smolts (Neeley rpt) and follow natural peak cycle	decrease Qs	ok	ok	increased spring flow for smolts (Neeley rpt) and follow natural peak cycle	decrease Qs	ok	ok	increased spring flow for smolts (Neeley rpt) and follow natural peak cycle	decrease Qs	ok	ok
Wapato (below Parker)	set freshets earlier; move from Jun to late Apr	More Q w/ variation following natural events	ok- regulated by Naches	ok- regulated by Naches	set freshets earlier; move from Jun to late Apr	More Q w/ variation following natural events	ok- regulated by Naches	ok- regulated by Naches	set freshets earlier; move from Jun to late Apr	More Qs w/ variation following natural events	ok- regulated by Naches	ok- regulated by Naches
Bumping River	ok	reduce Qs to more natural Q	for spawning in sep try to match inflow to outflow; goal to protect redds. Especially an issue in dry fall years.	Flows to protect redds and mimic natural inflow to create Q variation	ok	reduce Qs to more natural Q	for spawning in sep try to match inflow to outflow; goal to protect redds. Especially an issue in dry fall years.	Flows to protect redds and mimic natural inflow to create Q variation	ok	reduce Qs to more natural Q	for spawning in sep try to match inflow to outflow; goal to protect redds. Especially an issue in dry fall years.	Flows to protect redds and mimic natural inflow to create Q variation
Lower Naches	proctect redds and emergent fry; add mud to easton reach- pull off bottom of reservoir. + move smolts out	ok until flip flop. Reduce flip flop differential	ok	ok	proctect redds and emergent fry; add mud to easton reach- pull off bottom of reservoir. + move smolts out	ok until flip flop. Reduce flip flop differential	ok	ok	proctect redds and emergent fry; add mud to easton reach- pull off bottom of reservoir. + move smolts out	ok until flip flop. Reduce flip flop differential	ok	ok

= 1st priority **= 2nd priority** **= 3rd priority**

Irrigation Entitlements

Feedback received: 70% in a dry year is not realistic.
Suggested refinements:

Roza Irrigation District: 100,000 acre-feet of storage; would use 30,000 acre-feet in dry year and have storage for subsequent dry years.
Kittitas Reclamation District: Working on number for need in a dry year.
Wapato Irrigation Project: Maybe Yakama Nation could help quantify water need in dry year.
Sunnyside Valley Irrigation District: No additional storage needed for dry year.
Yakima-Tieton Irrigation District: No additional storage needed for dry year.

Yakima River basin annual water entitlements

(source: Final Planning Report/Environmental Impact Statement, Volume 1, Yakima River Basin Water Storage Feasibility Study; pg 2-6)

Irrigation entity	Annual water entitlements (ac-ft)[1]		
	Proratable	Nonproratable	Total
Kittitas Division	336,000		336,000
Roza Division	375,000		375,000
Wapato Irrigation Project	350,000	306,000	656,000
Sunnyside Division	143,000	316,000	459,000
Tieton Division	38,000	76,000	114,000
Other	42,000	519,000	561,000
Total basin	1,284,000	1,217,000	2,501,000

[1] Entitlements used when prorationing of the water supply available for irrigation is required. In some cases, Conditional Final Orders of the Adjudication Court and Water Right Settlement Agreements have established limitations on the volume that can be diverted in any year.

Municipal

Feedback received: The numbers from the Watershed Plan are dated (7 years old or more). Possible connectivity exists between groundwater and surface water. Need more accurate projections to account for changes in land use.
Suggested refinements: Consult with cities and counties to obtain out year projections, typically "20 year." Other sources of information: Capital Facilities Plan, Growth Management Act, water system analyses.

Municipal and domestic water needs for years 2000, 2010, 2020, and 2050

(source: *Final Planning Report/Environmental Impact Statement, Volume 1, Yakima River Basin Water Storage Feasibility Study*; pg 2-7)

	Number of services (in 1999)	Needs (acre-feet)			
		[1]2000	[1]2010	[1]2020	2050
Yakima River basin total	**109,180**	**115,772**	**138,199**	**163,316**	**[2]215,000**
Upper Yakima subarea					
Ellensburg	3,230	4,820	6,053	7,062	
Cle Elum	1,000	897	1,009	1,121	
Other community and Class B public water systems	3,111	3,139	3,845	4,551	
Noncommunity	881	988	1,210	1,432	
Yakima Training Center	4	90	90	90	
Households with own well	5,602	5,652	6,924	8,195	
Total Upper Yakima subarea	13,828	15,585	19,130	22,451	29,000
Middle Yakima subarea					
City of Yakima (potable supply)	16,756	17,151	18,384	19,393	
City of Yakima (irrigation supply)		Not available	2,242	2,242	
Nob Hill Water Association	7,595	3,811	4,708	5,717	
Selah	1,682	2,915	3,363	3,699	
Union Gap	1,200	1,211	1,398	1,586	
Terrace Heights	1,104	673	1,009	1,223	
Other community and Class B public water systems	3,489	3,520	4,066	4,611	
Noncommunity	154	173	199	226	
Yakima Training Center	109	90	90	90	
Households with own well	18,720	18,887	21,814	24,741	
Total Middle Yakima subarea	50,809	48,430	57,274	63,539	70,000
Naches subarea					
Other community and Class B public water systems	1,474	1,487	1,755	2,022	
Noncommunity	607	680	803	925	
Households with own well	2,575	2,598	3,066	3,533	
Total Naches subarea	4,656	4,765	5,623	6,481	18,000
Lower Yakima subarea					
Sunnyside	2,956	3,252	3,399	4,260	
Grandview	2,300	3,139	4,148	5,381	
Toppenish	2,000	2,018	2,331	2,643	
Wapato	1,104	1,345	2,803	3,139	

Municipal and domestic water needs for years 2000, 2010, 2020, and 2050 (continued)

(source: *Final Planning Report/Environmental Impact Statement, Volume 1, Yakima River Basin Water Storage Feasibility Study*; pg 2-8)

	Number of services (in 1999)	Needs (acre-feet)			
		[1]2000	[1]2010	[1]2020	2050
Lower Yakima subarea (continued)					
Benton City	729	224	785	1,345	
Prosser	1,600	3,139	3,587	3,924	
Richland	5,451	9,192	9,753	15,358	
West Richland	2,200	2,915	3,924	6,278	
Other community and Class B public water systems	6,777	6,837	7,897	8,957	
Noncommunity	272	305	353	399	
Households with own well	14,498	14,627	16,894	19,161	
Total Lower Yakima subarea	39,887	46,993	56,172	70,844	[4]98,000
LESS: Richland and West Richland[3]	-7,561	-12,107	-13,677	-21,636	[5]-29,000
Adjusted lower basin	32,326	34,886	42,495	49,208	69,000
Yakima River basin groundwater and surface water supply	101,619	103,666	124,522	141,679	186,000
Increase from year 2000			20,000	38,000	82,000

[1] From table 6 of the *Municipal, Domestic, and Industrial Water Needs and Supply Strategies,* January 2002, Technical Memorandum prepared by Economics and Engineering Services. This is consistent with table 2-1 of the January 6, 2003, *Watershed Management Plan, Yakima River Basin.*

[2] From exhibit 2-2 of the W*atershed Management Plan*, *Yakima River Basin.*

[3] Water system plans provide for joint development of Columbia River surface supply.

[4] Section 2.3 of the January 6, 2003, *Watershed Management Plan, Yakima River Basin* provides information on the extent of increased needs in the upper Yakima, middle Yakima, and Naches subareas from year 2000 to year 2050. These increased needs were added to the respective subareas' year 2000 use to provide a year 2050 total of 117,000 acre-feet for the three subareas. The 117,000 acre-feet were subtracted from the Yakima River basin total need of 215,000 acre-feet, providing a figure of 98,000 acre-feet for the lower Yakima subarea.

[5] The year 2020 need of the cities of Richland and West Richland is 30 percent of the lower Yakima subarea year 2020 estimated need. The 30-percent figure was applied to the lower Yakima subarea year 2050 need of 98,000 acre-feet, resulting in a year 2050 estimated need of 29,000 acre-feet for these two cities.