MODELING APPROACH TO STRUCTURAL PROJECTS
IN THE PRELIMINARY INTEGRATED PLAN SCENARIO

1. Future Without Integrated Plan

1.1. Conservation

A portion of the conservation projects was moved from the Project scenarios to the Future Without Integrated Plan scenario. These projects are:

Table 1. Conservation In Future Without Integrated Plan

Location	Total Conservation [acft/yr]	Instream Benefit [acft/yr]	Irrigation Benefit [acft/yr]
1: RZCW Roza	36,000	0	36,000
3: SNCW Sunnyside	54,600	36,400	18,180
4: BENW Benton	6,870	5,420	1,450

Notes: Conservation amounts are based on a full water supply. Proration will result in lower realized conservation. Irrigation benefit may accrue through decreased reservoir releases during a full water supply, or increased diversions during prorated to obtain a full irrigation supply.

1.2. Point of Diversion Changes

- Benton Irrigation District moves its point of diversion from Sunnyside canal to a new diversion on the Yakima River. Sunnyside canal diversions are reduced by the ratio of Benton ID volume to total Sunnyside volume, 18520 acre-feet to 458520 acre-feet or approximately 4%.
- Satus pumps are used to move approximately 50 cfs of diversion from the Wapato main canal to a location downstream of Granger. The pumps are used when diversions into Roza canal exceed 50 cfs. This typically allows the pumps to operate from March 17th to October 18th.

2. Future With Conservation and Groundwater Recharge/Recovery

2.1. Conservation

No Wapato conservation projects were considered, under the assumption that these projects would contribute to full build-out of tribal irrigation. Conservation projects are:

Location	Total Conservation [acft/yr]	Instream Benefit [acft/yr]	Irrigation Benefit [acft/yr]
0: KTCW Kittitas	40,735	0	40,735
1: RZCW Roza	36,000	0	36,000
2: RZCW Roza	23,900	0	23,900
3: SNCW Sunnyside	54,600	36,400	18,180
4: BENW Benton	6,870	5,420	1,450
5: KTCW Kittitas	2,000	0	2,000
6: WESW Westside	600	0	600
7: WESW Westside	2,618	0	2,618
8: ELTW Ellensburg	3,026	0	3,026

Town			
9: CADW Cascade Pumps below Slide	2,088	0	2,088
10: CADW Cascade Pumps below Slide	2,579	0	2,579
11: BUCW Bull	639	0	639
12: BUCW Bull	429	0	429
13: UNGW Union Gap	200	0	200
14-16: Wapato	0	0	0
17: SNCW Sunnyside	4,265	0	4,265
18: SOUW South Naches	9,733	0	9,733
19: NSCW Naches Selah	16,675	0	16,675
20: KNCW Kennewick	28,200	0	28,200

Notes: Conservation amounts are based on a full water supply. Proration will result in lower realized conservation. Irrigation benefit may accrue through decreased reservoir releases during a full water supply, or increased diversions during prorated to obtain a full irrigation supply.

2.2. Point of Diversion Changes

- The Benton ID and Status pump diversion changes in the FWIP are retained in this scenario.
- Kennewick diversion changes to the Columbia River; no water is diverted from the Yakima basin.

2.3. Groundwater Storage and Recovery

Two groundwater storage and recovery locations are modeled at Thorp and Marion Drain (near Wapato canal). Diversion during the non-irrigation season (November 1st to end of February) are made if river flows are above 1,000 cfs. No more than 90% of the flow above 1,000 cfs is diverted up to a maximum monthly rate of 10,000 acre-feet per month or 50,000 acre-feet per year for each project. Groundwater recovery occurs passively (increased baseflow over time to Yakima River) at a rate of 0.01/day (approximately 70 day average return period) at Thorp and 0.005/day (approximately 140 day average return period) at Marion Drain. No active recovery (pumping out of the aquifer based on irrigation needs) is modeled.

3. Integrated Plan

3.1. Conservation

Conservation projects listed in section 2.1 are used in the Integrated Plan scenario.

3.2. Point of Diversion Changes

Point of diversion changes listed in section 2.2 are used in the Integrated Plan scenario. Additionally, Naches Selah irrigation is moved to the Wapatox canal.

3.3. Groundwater Storage and Recovery

Groundwater storage and recovery projects listed in section 2.3 are used in the Integrated Plan scenario.

3.4. Proposed Wymer Reservoir

Capacity is 162,500 acre-feet, 82,500 to instream flow and 80,000 to additional supply. Thorp pumping and pipeline capacity is 1,000 cfs. Diverts from Thorp during winter and spring, keeping a minimum of 1,000 cfs in the river, . . During the non-irrigation season, flood flows in excess of 1,000 cfs can be diverted into the irrigation account of Wymer. Lake Cle Elum can release flows that are stored in Wymer up until the storage control date for accrual in the instream account in Wymer, . The irrigation account contributes to TWSA only at times when prorationing without Integrated Plan projects is less than 70%. Wymer irrigation water can only be used to the extent needed to bring prorationing up to 70%. The instream account does contribute to TWSA each year and is applied to Parker minimum flows between July and the end of September.

3.5. Proposed K-K Pipeline

The 5-mile long pipeline is intended to reduce high flows in the river below Keechelus, and to capture additional storage that may be spilled. Pipeline capacity is 400 cfs, which is reduced to 200 cfs after March 31st based on the smolt migration; this upper limit is increased to 400 cfs after August 1st. Transfers will occur when Keechelus is above 80,000 acre-feet and will stop if Keechelus drops below this level (this level was arbitrarily set to maintain some storage in Keechelus during the worse drought year). Flows into Kachess occur if Kachess is below 450,000 acre-feet during the flood season (set to prevent additional spills from Kachess) or below the conservation pool in non-flood season.

3.6. Kachess Inactive Storage

Revisions to the outlet works (using a tunnel or a pump station) to allow the reservoir to be drawn down by an additional 200,000 acre-feet in when prorationing is less than 70%. While prorationing will be recalculated when inactive storage is used, Title XXII flows will not consider additional storage in the inactive pool. Outlet currently assumed to go to Lake Easton.

3.7. Proposed Cle Elum Dam Raise

Increase maximum flood pool and conservation pool by 3 feet ( ). TWSA and prorationing will consider this expanded pool when prorationing falls below 70%. No other operational changes are made. Title XII flows will not consider the expanded pool storage.

3.8. Proposed Bumping Reservoir Expansion

Bumping Reservoir is increased in size to 190,000 acre-feet total size, of which approximately 156,000 acre-feet is the top of conservation (remainder is flood control space). The current size of the flood pool is maintained, with elevations increased. Prorationing will consider the expanded Bumping storage when prorationing falls below 70%; Title XII flows will not consider expanded Bumping storage. No other operational changes are made; for example the reservoir is not divided into irrigation and instream accounts (pending feedback from subcommittee). Some model changes are made to balance operations between Rimrock and Bumping.

3.9. Enhanced Instream Flows

Enhanced instream flows are applied to Keechelus reach, Cle Elum reach, Easton reach, Lower Naches, and Tieton reaches. Keechelus minimum flow is 120 cfs, with a 7 day spring flood pulse near the end of April peaking at 500 cfs. The date of the spring flood may change each year to make use of the natural hydrograph. Cle Elum minimum flow is 300 cfs, with a spring flood pulse of 1,000 cfs. The Easton reach uses 250 cfs minimum flow decreasing to 220 cfs from September to December; the spring flood flow is 1,000 cfs at this location. The Tieton reach calls for 125 cfs from October to April while the Lower Naches reach calls for 550 cfs between June and October.

Minimum outflows from Bumping reservoir vary based on the storage in the reservoir, from 0 cfs at low storage up to 200 cfs at storage above 20,000 acre-feet.

Outflows from Keechelus are curtailed starting in July. Flows are limited to no more than 500 cfs in July decreasing to 120 cfs by the end of August to the end of the irrigation season. Demands not being met from Keechelus are transfers to other reservoir releases.