Strategies for Addressing Water Supply Concerns

Danielle Squeochs
Yakama Nation Fisheries
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Summary

- Water availability considerations for storage
- Understanding what the water supply elements can do for instream and out-of-stream uses
- Future steps

Water Storage Goals

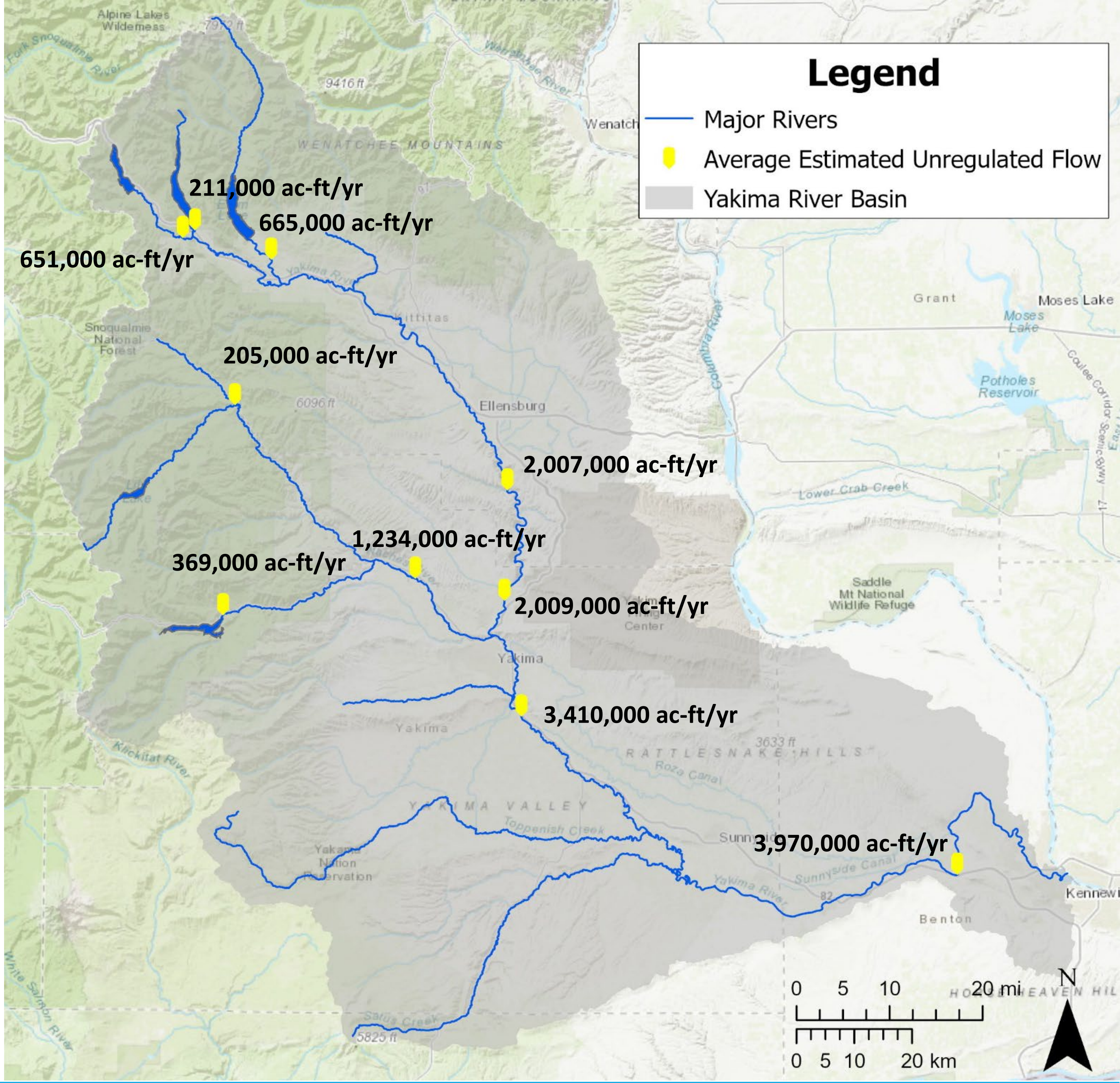
Yakima Basin (YBIP) has identified a goal of 450K ac-ft of new water supply

- Out-of-stream uses
  - Irrigation
  - Municipal and Domestic
- Instream Uses

Both Irrigation and Instream users are looking for large quantities of shapeable water

Where is water available in the Basin?

- More water availability lower in the basin
- Some watersheds are more productive than others

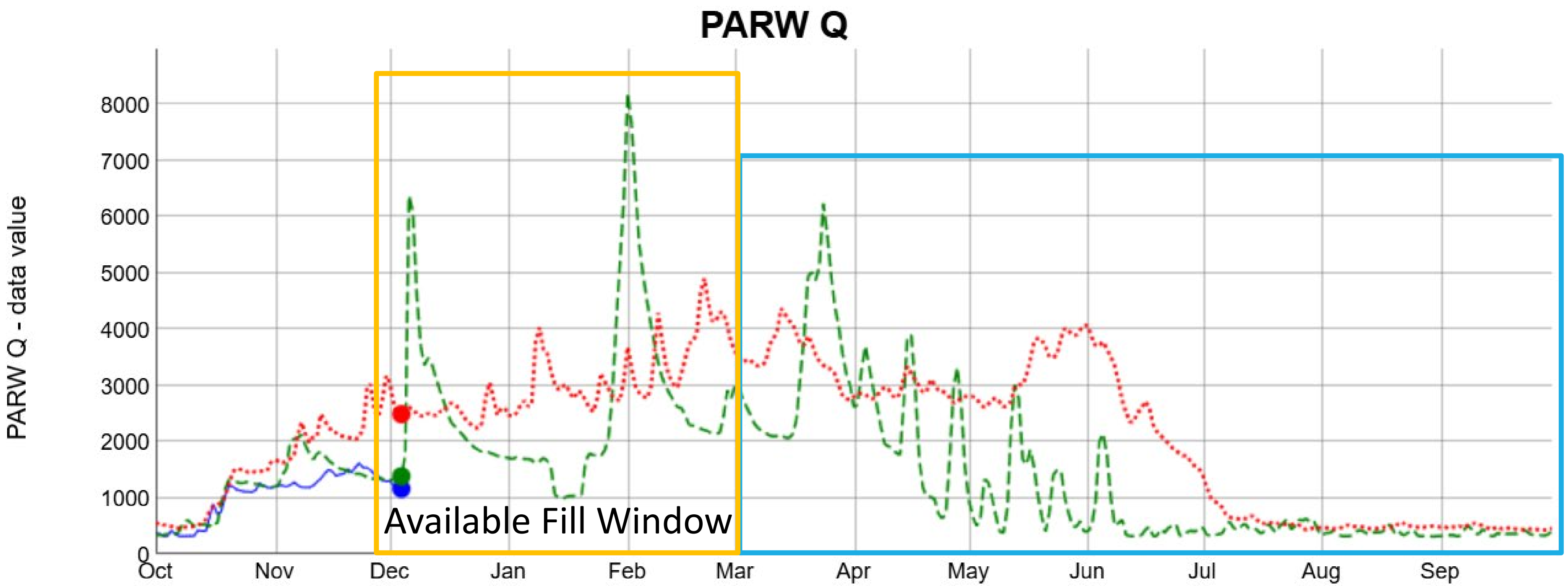


Values Obtained from Table 2-4 Interim Operating Plan (2002)

When is water available ?

Water Year Graph

Dec 4:
Current Year: 1163.01
Previous Year: 1385.48
Average: 2488.7

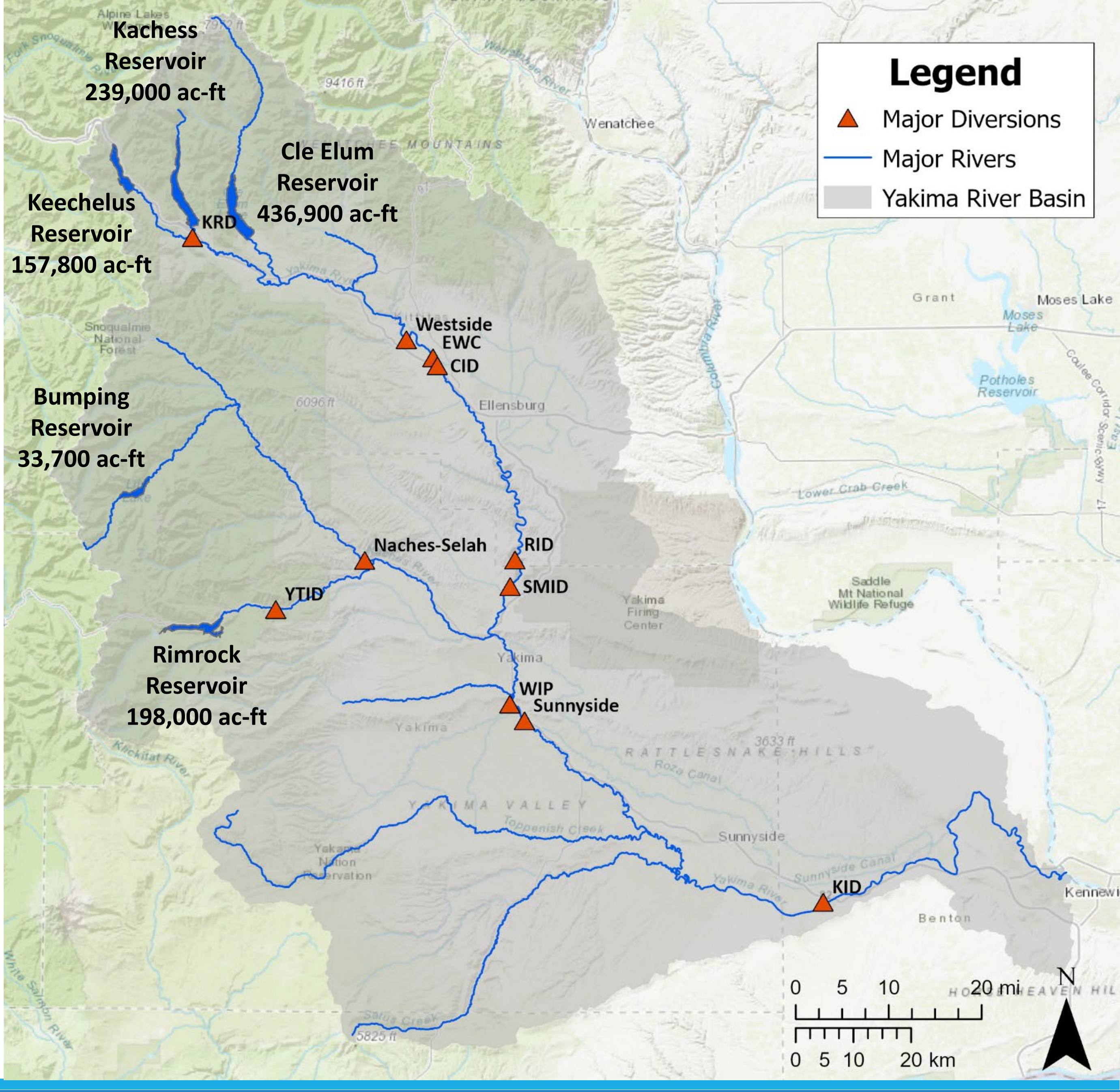


Current Data Graph

PROVISIONAL DATA - Subject to change

Diversions and Storage Locations

- Reservoir storage is approximately 1.1M ac-ft
- Time-immemorial water right for instream flows
- Irrigation entitlements are 2.5M ac-ft

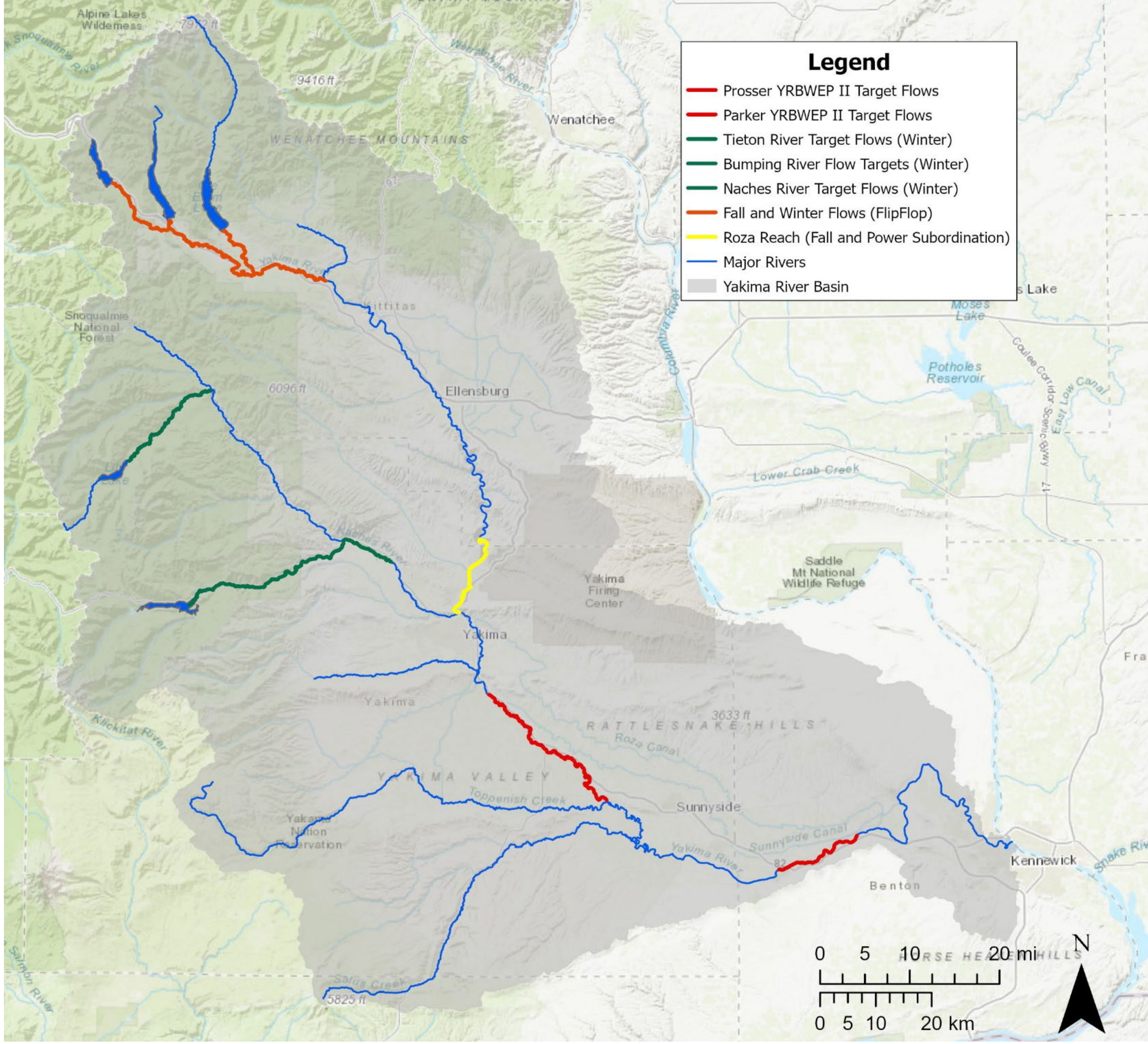


Target Flows

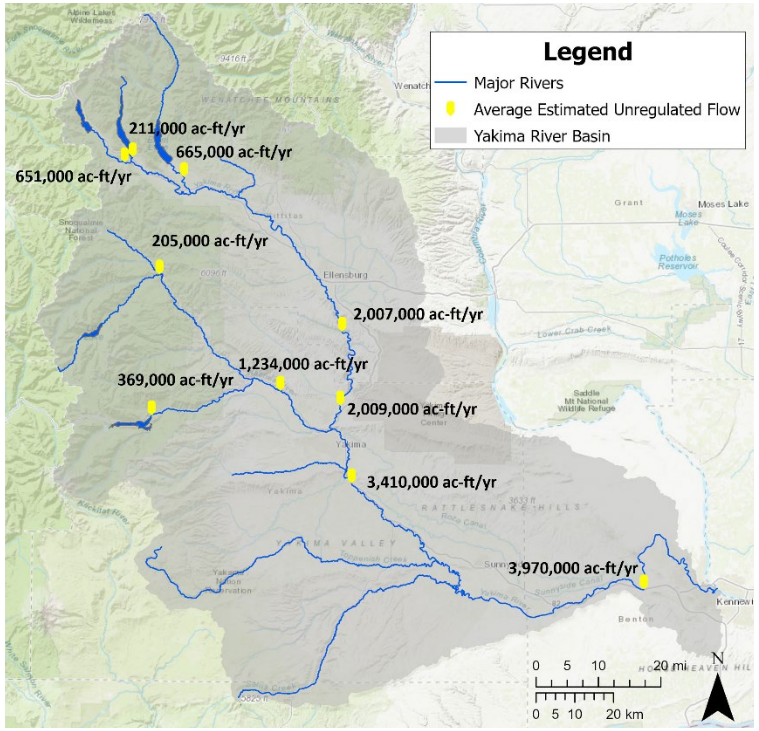
Table 5-11.–Historical Reclamation Fish-Related Operational Streamflow Targets[4]

River Reach	Fall	Winter	Title XII Target	Power Subordination
Keechelus Outflow (KEE) from dam to Crystal Springs	60-100 cfs[2] Sep 1 - Oct 20 (1990-2000)	15-100 cfs[3, 4] Oct 21 - Mar 31 (1990-2000)		
Yakima River at Crystal Springs (YRCW) from Crystal Springs to Lake Easton	60-100 cfs[2] Sep 1 - Oct 20 (1991-2000)	30-100 cfs[3, 4] Oct 21 - Mar 31 (1991-2000)		
Kachess Outflow (KAC) from dam to Lake Easton		5-50 cfs[3] Oct 21 - Mar 31 (1989-2000)		
Yakima River at Easton (EASW) from Easton Dam to Cle Elum River	150-300 cfs[2] Sep 10 - Oct 20 (1981-2000)	80-300 cfs[3, 4] Oct 21 - Mar 31 (1981-2000)		
Cle Elum Outflow (CLE) from dam to Yakima River	150-650 cfs[2] Sep 10 - Oct 20 (1981-2000)	60-300 cfs[3, 4] Oct 21 - Mar 31 (1981-2000)		
Yakima River at Cle Elum (YUMW) from Cle Elum River to Teanaway River	400-800 cfs[2] Sep 10 - Oct 20 (1981-2000)	200-325 cfs[3, 4] Oct 21 - Mar 31 (1981-2000)		
Yakima River below Roza Diversion Dam (RBDW) from dam to below Wenas Creek	200-300 cfs minimum Jul 1 - Oct 20 (1989-1999)			300-400 cfs[5] Oct 21 - Mar 31 (1989-1999) 300-600 cfs[5] Oct 21 - Mar 15 (2000)
Bumping Outflow (BUM) from dam to American River		50-120 cfs[3, 4] Oct 21 - Mar 31 (1987-2000)		
Rimrock Outflow (RIM) from dam to YTID Diversion		15-50 cfs[6, 4] Oct 21 - Mar 31 (1990-2000)		

River Reach	Fall	Winter	Title XII Target	Power Subordination
Naches River near Naches (NACW) from PP&L Diversion Dam to below Power Return		100-125 cfs[7, 4] Oct 21 - Mar 31 (1986-2000)		125 cfs[7] Oct 1 - Sep 30 (1986-2000)
Yakima River near Parker (PARW) from SVID Diversion Dam to Granger Drain		300 cfs minimum for fish passage Mar 15 - Oct 21 (1988-1994)	300-604 cfs[4] Apr 1 - Oct 31 (1995-2000)	
Yakima River at Prosser (YRPW) from Prosser Diversion Dam to below Power Return			300-604 cfs[4] Apr 1 - Oct 31 (1995-2000)	450-1400 cfs[8] Nov 1 - Mar 31 (1995-2000) 50-200 cfs minimum for fish passage Mar 1 - Feb 28 (1958-1994) 450-1000 cfs[9] Apr 1 - Jun 30 (1994-2000)

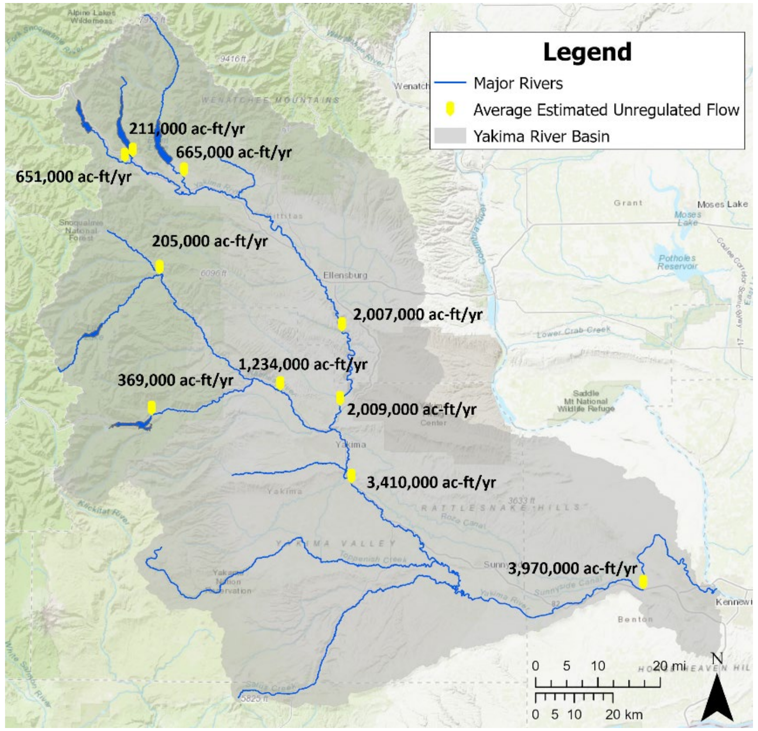


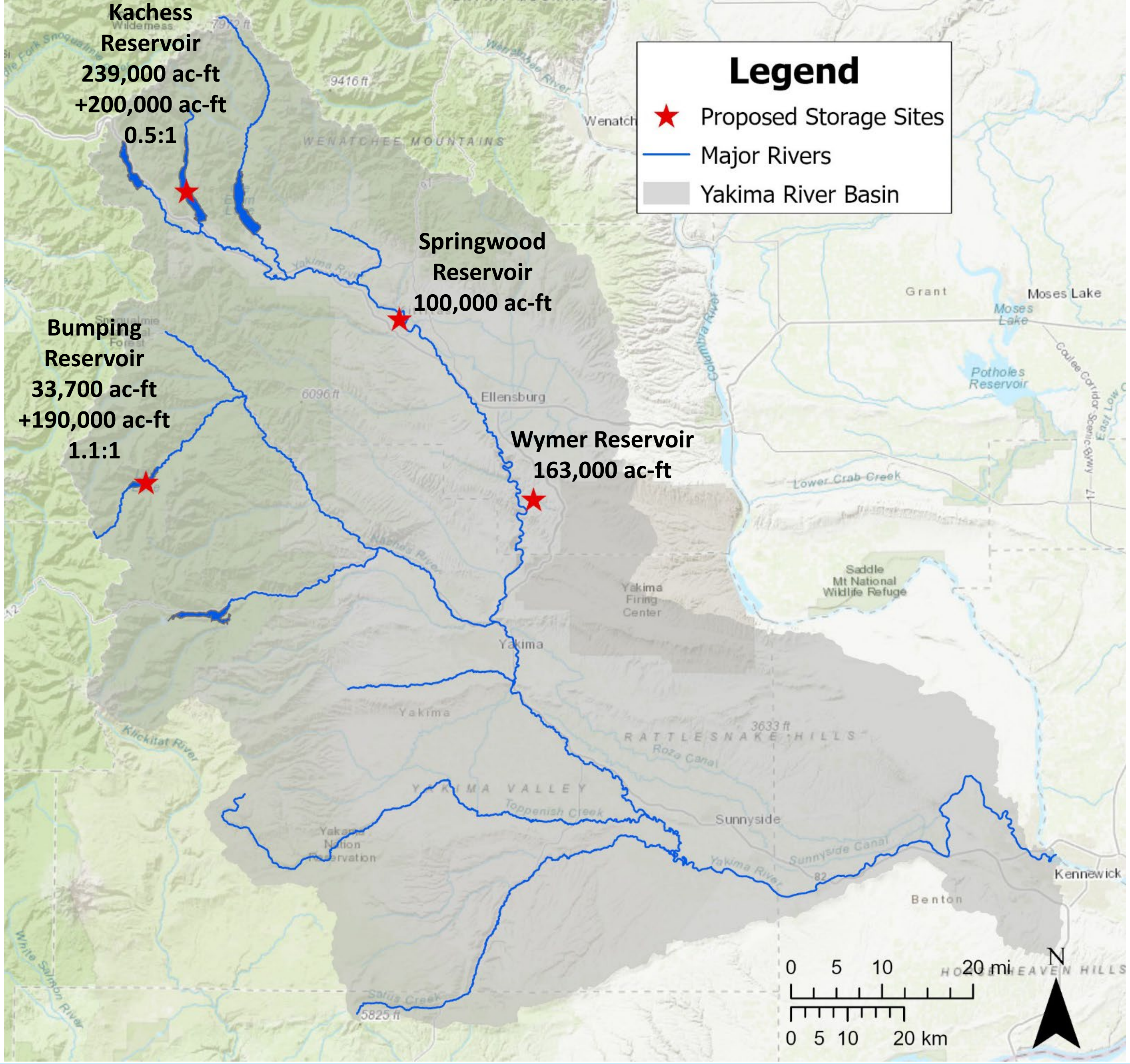
Refill Ratios



Values Obtained from Table 5-14 Interim Operating Plan (2002)

New Storage Projects





Key Points from Water Supply

- Headwater storage is limited by water availability of the watershed
- Historically, the location of supply projects was not necessarily selected based on water availability
- Under YBIP, Fisheries/Environmental interests agreed to storage under the premise that it would not further the harm already caused (T. Ring – "Repeat the sins of the past")
  - Normative flow regime
  - It doesn't make sense to store water for fish when it would be used for fish

Surface Water Storage a Critical Component of Addressing Future Needs

Where can we build the storage facility?

How do we fill the storage facility?

- There is no new water supply
- Spring spill is currently supporting fish outmigration

Surface Water Storage

The YBIP elements (or tools) work together to create Water Supply

Surface Water Storage

Reservoir Fish Passage

Habitat/Watershed Protection

Structural and Operational Changes

Enhanced Water Conservation

Groundwater Storage

Market Reallocation

How to the elements (or tools) build on Water Supply

Large Increase in Flow and Shapeable

Surface Water Storage

Limited Increases in Flow,
Moderately Shapeable, and Reach Benefits

Market Reallocation

Groundwater Storage

Enhanced Water Conservation

Habitat/Watershed Protection

How to the elements (or tools) build on Water Supply

Large Increase in Flow and Shapeable

Surface Water Storage

But how do we fill it given water supply limitations?

And without causing additional harm to fish?

Limited Increases in Flow,
Moderately Shapeable, and Reach Benefits

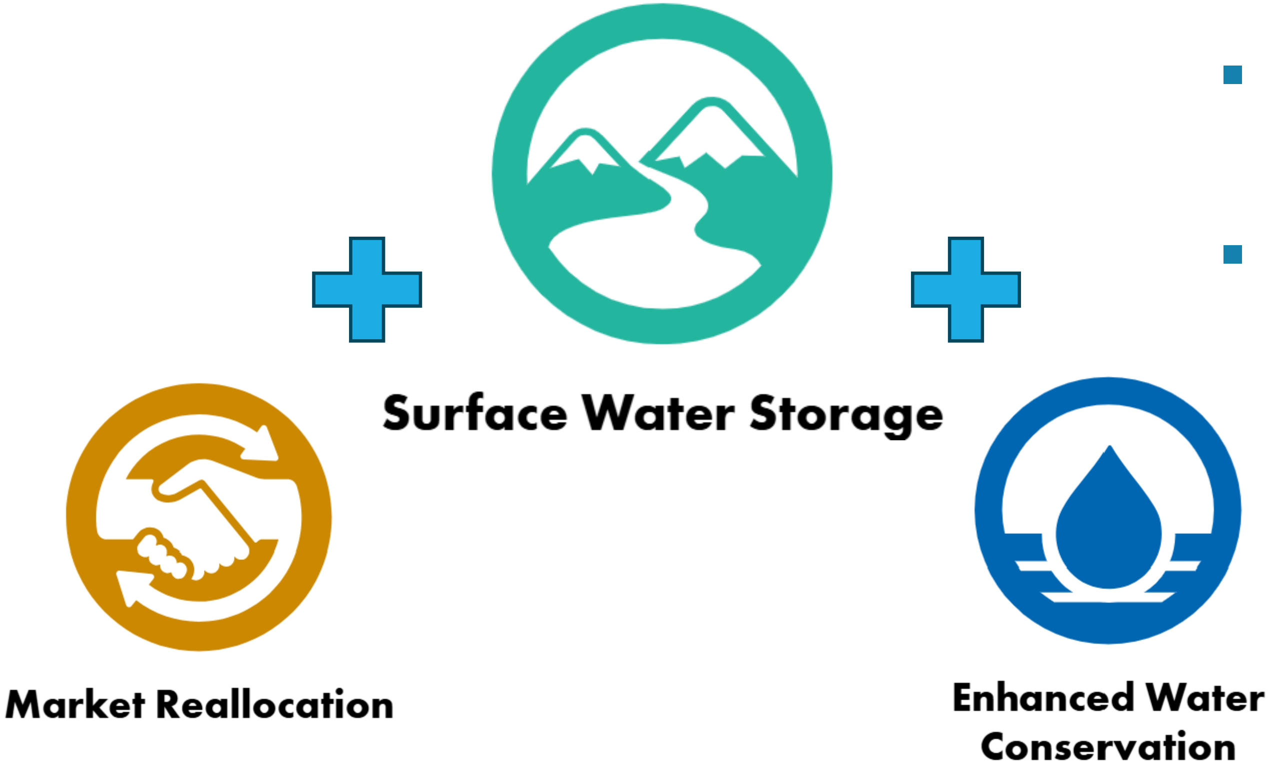
Market Reallocation

Groundwater Storage

Enhanced Water Conservation

Habitat/Watershed Protection

How to the elements (or tools) build on Water Supply



- Fill when wintertime water is available
- Store trust water and other leased water when available and in full water supply years
- Conserved water
  - Non-consumptive (intentionally store for instream flow purposes)
  - Consumptive (store for future uses)

Groundwater Storage

Groundwater Storage

Groundwater storage is well suited for:

- Municipal uses
- Steady demand profile
- Places with local benefits (habitat or within a district)
- A method to offset or supplement demand

Poorly suited for:

- Large shapeable flows
- Variable demand profile

Habitat Protection and Restoration

Habitat/Watershed Protection

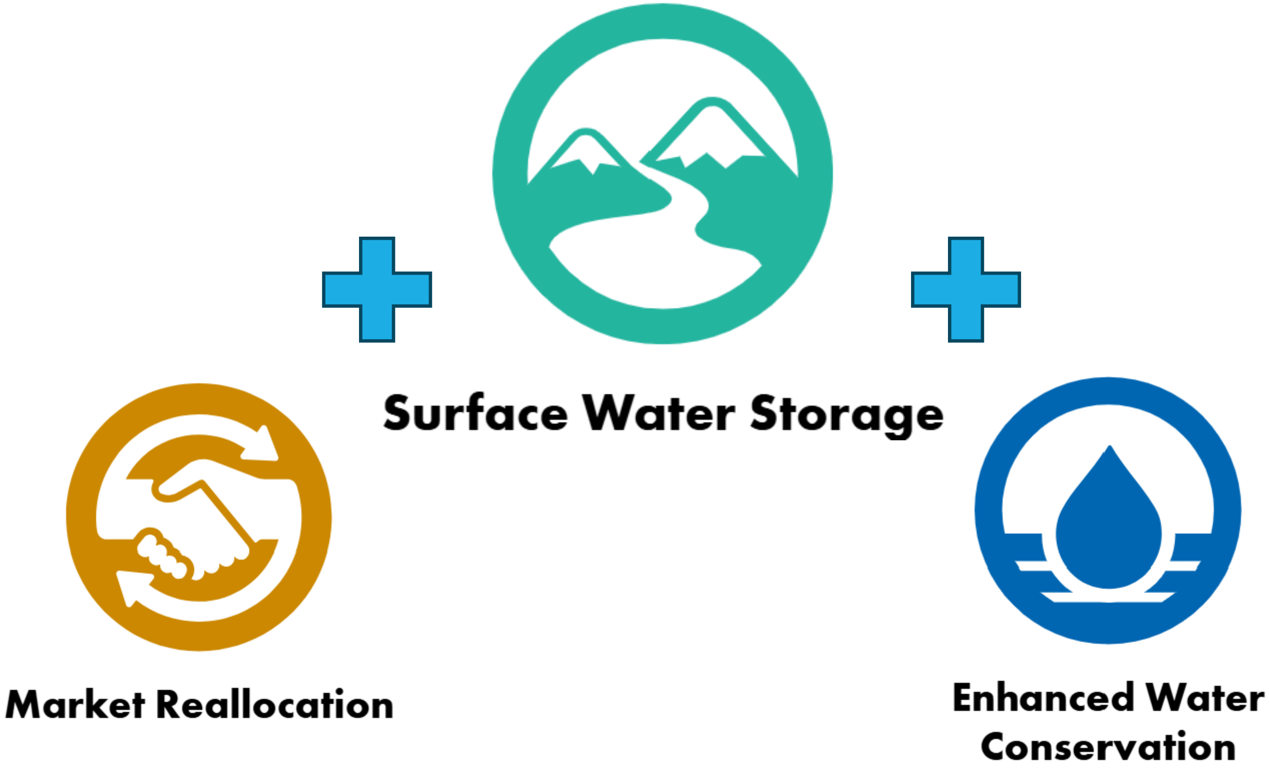
Habitat Restoration provides:

- Fish habitat
- Floodplain resilience
- Ecosystem Benefits
- Potential instream flow benefits (timing and volume difficult to control)

Does not provide:

- Large shapeable flows

How to the elements (or tools) build on Water Supply



Market Reallocation as it Relates to Storage

Market Reallocation

Where this works:

- Acquisition of senior water right
- Storable portion held in a reservoir and dedicated for specific purpose

Complications:

- Not all water rights are storable
- Some senior water rights still have availability limitations
- Year-over-year storage – we need a new reservoir to store past years' water, otherwise a potential impact on TWSA

Example:

- Store the Basin Conservation water in Springwood

Market Reallocation as it Relates to Storage

Market Reallocation

Examples of Implementation:

- In a full water supply year, store Trust Water Rights in a new storage facility
- Purchase senior water rights, store available portion, and use reservoirs to retime
- Invest in senior district conservation and purchase nonconsumptive water

Other Considerations:

- This approach is only viable with new storage
- An analysis of individual water rights is necessary to determine reliability and storable component

Water Conservation

Enhanced Water Conservation

District conservation provides:

- Nonconsumptive water (water that would otherwise be stored in the ground) increases carryover storage
- Drought resilience
- Ability to better manage water

Limitations:

- Only a portion of conserved nonconsumptive water is available for storage
- Eventually, conservation will reduce wintertime streamflow

Water Conservation

Enhanced Water Conservation

Examples of Implementation:

- KRD Water Conservation Program 100K ac-ft conserved (30K ac-ft potentially storable)
- WIP Water Conservation Program 165K ac-ft conserved (Unknown portion potentially storable)
- Selah-Moxee, Cascade, Westside, and others

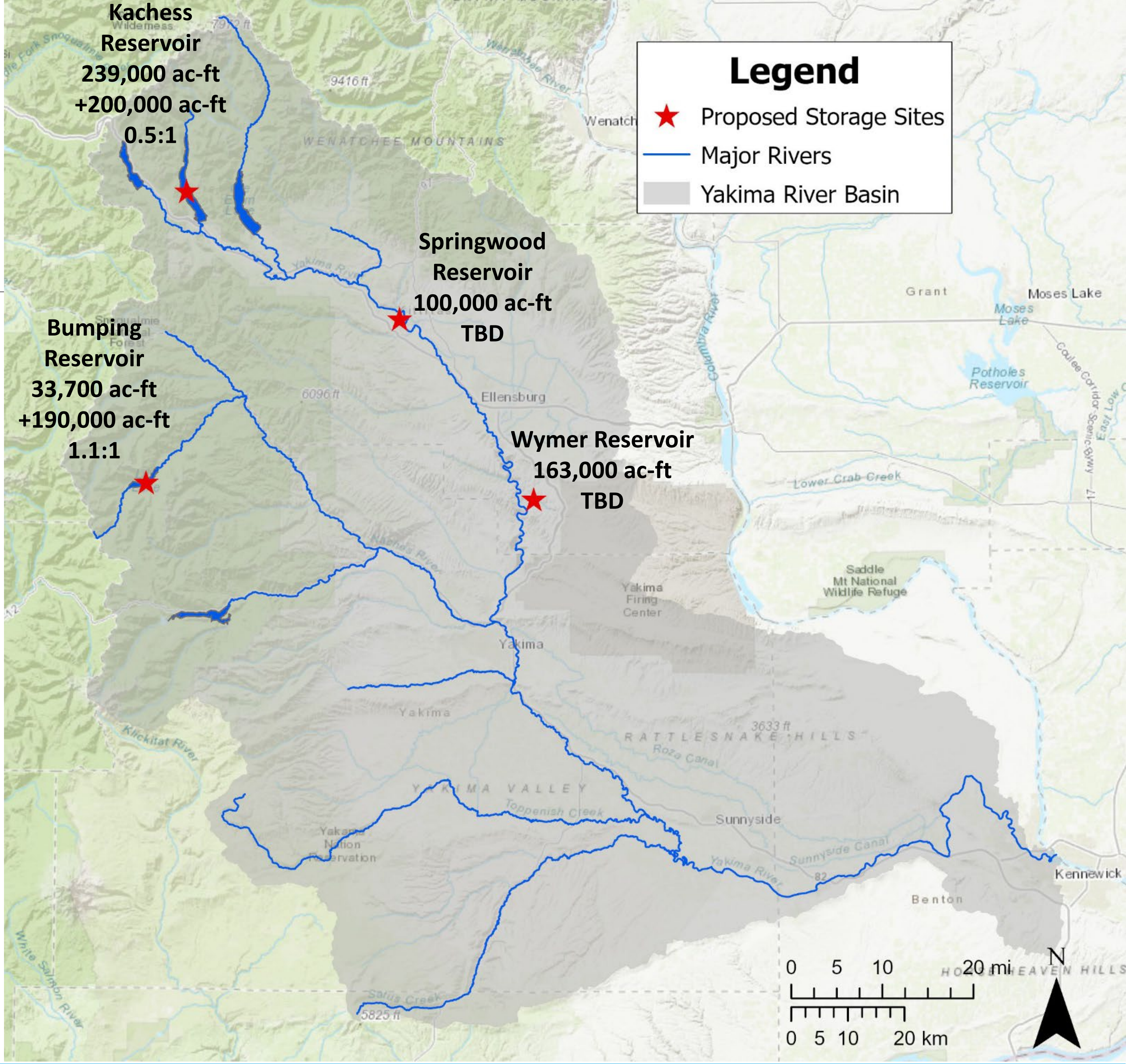
Other Considerations:

- Storable water would be the quantity previously stored in the groundwater and that returns to the Yakima River during the wintertime months

Moving Forward

YBIP has identified aggressive surface storage goals

- Filling proposed storage with “excess winter flow” is unlikely to meet water supply goals, even with climate change
- Use of water marketing and intentional storage of conserved water may address some gaps
- Groundwater storage should be used, where possible, to address needs especially when it allows for diversion lower in the system



Thank you

Passive to Semi-Passive Groundwater Recharge Opportunities

Natural Infrastructure

Positives
- Low Cost
- Low Maintenance
- Restores ecosystem function, habitat, and creates a more resilient watershed

Drawbacks
- Low certainty and control in timing and volume of water supply benefits

Best Suited
- Areas where natural processes are intact and can support restoration
- Low development or landowners supportive of beaver activity
- Locations with low risk to infrastructure

Stream Restoration and Floodplain Reconnection

Positives
- Low to medium project cost
- Low maintenance
- Restores ecosystem function, habitat, and creates a more resilient watershed
- Decreases flood risk

Drawbacks
- Low certainty and control in timing and volume of instream flow benefits
- Additional design and engineering may be needed to mitigate risks to infrastructure

Best Suited
- Locations where restoration is needed

Forest Management for Snowpack Retention

Positives
- Low cost
- Low maintenance
- Supports forest health

Drawbacks
- Low certainty and control in timing and volume of water supply benefits
- Benefits to water supply highly variable

Best Suited
- Areas where forest health will benefit from additional management

Low certainty and control in the timing and volume of water supply benefits

*These are generalizations

Managed Groundwater Recharge

Shallow Groundwater Recharge

Positives

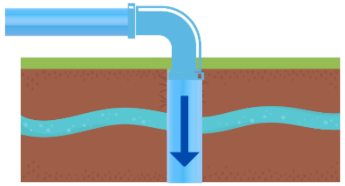
- Medium project cost
- Additional control, flexibility, and certainty in timing and volume of flow benefits

Drawbacks

- Requires staff, maintenance, and monitoring
- Design and engineering needed to mitigate risks to infrastructure

Best Suited

- Locations where groundwater recharge is needed but infrastructure or development preclude more nature-based approaches
- The project requires additional certainty and control of water application and recovery



Aquifer Storage and Recovery

Positives

- Additional control, flexibility, and certainty in the timing and volume of recharge benefits
- Able to recharge deeper groundwater units

Drawbacks

- Expensive
- High maintenance
- Requires staff, maintenance, and monitoring
- Design and engineering needed to mitigate risks to groundwater

Best Suited

- Aquifers that have the capacity to store water
- Location where source control is needed (municipal ASR)

*These are generalizations

Strategies that Influence Groundwater Recharge

Conservation

Positives

- Medium project cost
- Improves delivery efficiency and drought resilience

Drawbacks

- Does not produce new water supply
- Largely non-consumptive water
- Potentially limited to reach scale benefits

Best Suited

- Projects where additional water efficiency is needed

Groundwater Recapture, Reuse, and Retiming

Positives

- Low cost
- Improves water quality and water management

Drawbacks

- The quantity of water may be reduced with conservation
- Groundwater recapture (through wells) requires rulemaking
- Potential downstream impacts

Best Suited

- Areas where irrigation districts have infrastructure to recapture flows

*These are generalizations

Other Water Supply Strategies

Water Right Acquisitions

Positives

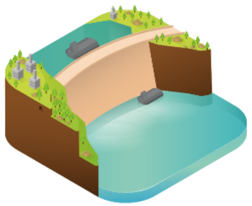
- Provides water for instream flows or other uses
- Certainty in quantity and timing of flow benefits once the transfer process is completed

Drawbacks

- Medium to high cost ($10,000 per acre-ft)
- Requires a willing seller
- Complex water right transfer process
- A limited number of valid water rights
- May only provide reach scale benifits

Best Suited

- Locations with valid water rights and a willing seller



Surface Storage

Positives

- High control, flexibility, and certainty in the timing and volume of flow benifits
- Able to recharge deeper groundwater units

Drawbacks

- High Cost
- High maintenance
- Requires staff, maintenance, and monitoring
- Potential impacts on cultural resources, land use, ESA, etc.

Best Suited

- Large-volume projects that require significant flexibility and control

*These are generalizations