

**September 8, 2009
YRBWEP Workgroup
Breakout Group Findings on Integrated Package**

Element	Green	Red	Blue
Groundwater Storage Municipal ASR	<p>Summary: Include project Timeframe/Priority: 0-5 years</p> <ul style="list-style-type: none"> • Yakima ASR, Kennewick ASR, and other municipal ASR <ul style="list-style-type: none"> ○ Because existing system (wells, treatment) is in place, the capital costs are minimal ○ Small water amounts ○ Small incremental costs ○ Climate change/variability resilient and flexibility 	<p>Summary: Include project Timeframe/Priority: 0-10 years, high priority</p> <ul style="list-style-type: none"> • Need to conduct pilot project • Needs to be integrated with conservation • Water should not be used for watering lawns 	<p>Summary: Include project for municipalities other than Kennewick Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • ASR requires treated water and is therefore expensive. ASR is only feasible for municipalities. • Carry forward municipal ASR (exclude Kennewick)
Groundwater Storage Agricultural ASR	<p>Summary: Table project due to cost Timeframe/Priority: N/A</p> <ul style="list-style-type: none"> • High treatment costs and multiple locations • High volumes • Need to determine difficulty of recapturing water • Legal/administrative issues • May be more viable as water economics/availability changes • Could be resilient to climate change 	<p>Summary: Include but low priority due to cost Timeframe/Priority: Mid to late, low priority</p> <ul style="list-style-type: none"> • Expensive • Second-tier priority 	<p>Summary: Likely will not include due to cost Timeframe/Priority: N/A</p> <ul style="list-style-type: none"> • ASR requires treated water and is therefore expensive. Due to the cost, agricultural ASR will likely not be feasible.
Groundwater Storage Surface Infiltration	<p>Summary: Include, but need a pilot program and more feasibility study Timeframe/Priority: 0-5 years for</p>	<p>Summary: Include, but need a pilot program Timeframe/Priority: Pilot project in 0-10 years, high priority</p>	<p>Summary: Include but need a pilot program or more study Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Need minimal flow threshold/

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	<p>feasibility; implement after</p> <ul style="list-style-type: none"> • Needs more study/pilot program to verify: <ul style="list-style-type: none"> ○ Costs – need more definition ○ Benefits/timing ○ Location and volume of water available • Need to manage legal/administrative issues • Fish benefits (cooler flow) and wildlife • Water supply benefits 	<ul style="list-style-type: none"> • Need a pilot to identify benefits and issues related to: <ul style="list-style-type: none"> ○ Water supply ○ Water quality ○ Tributary enhancement ○ Potential impacts downgradient 	<p>diversion for each region; trigger</p> <ul style="list-style-type: none"> • USGS study will provide information and may help workgroup prioritize projects • Relative cost to benefit (unit costs) • Return utilization of water (ROI) • How do these meet demand? Need to understand better • Kennewick – low in pool; no benefit to Yakima Basin • Don't know storage capacity or resident time therefore pilot/modeling analysis is needed for surface infiltration
Conservation	<p>Summary: Develop programmatic approach. Identify and evaluate conservation measures to include</p> <p>Timeframe/Priority: Initiate program in 1-2 years, ongoing thereafter</p> <ul style="list-style-type: none"> • Municipal conservation <ul style="list-style-type: none"> ○ Water efficiency rule has standards ○ Should focus on landscape irrigation, education/standards, rates, regulations • Identify conservation measures <ul style="list-style-type: none"> ○ Approximate cost \$10-\$15 million per year 	<p>Summary: Develop a programmatic approach</p> <p>Timeframe/Priority: High priority with ongoing implementation</p> <ul style="list-style-type: none"> • Should use a programmatic approach (refer to CAG for refinement) • Could provide a significant volume of water supply • Should reduce water right transfer costs/create benefits to Districts • Create incentives for on-farm improvement and carry over conservation 	<p>Summary: Develop a programmatic approach</p> <p>Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • There are additional conservation projects that are not provided on current list that should be included • Conservation has greater value at different places in Basin; should optimize • Need programmatic scrutiny e.g. Conservation Advisory Group's groundrules re saved water distribution • Some projects might fall out –

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	<ul style="list-style-type: none"> ○ Non-consumptive (not new water) ○ Evaluate reach by reach supply benefits and benefits to: <ul style="list-style-type: none"> ▪ Fish ▪ Water quality ▪ Flow ▪ TWSA ▪ Timing ○ Integrates with infiltration and timing • Develop minimum standards <ul style="list-style-type: none"> ○ Conveyance loss per mile ○ Spill reduction/avoidance (re-reg) ○ Recapture losses • Improve on farm management <ul style="list-style-type: none"> ○ Incentive programs ○ Water quality standards (water leaving farm) ○ BMPs 	<ul style="list-style-type: none"> • Water quality benefits • Cost for benefit threshold • Enhancement of floodplain/habitat • Complete reach by reach review of benefits • Required in integrated package • Works with reallocation 	<p>eg:</p> <ul style="list-style-type: none"> ○ Yakima Valley Canal ○ Westside Irrigation ○ Ellensburg Water Co ○ Cascade Irrigation District ○ Bull Canal Companyl • Two projects great size value <ul style="list-style-type: none"> ○ Wapato ○ Naches Selah • Need willing constituents – re local matching \$ • Comparative to other elements – value when integrated • Maximize BMPs and conservation more environmental options • Tight ditches – help seasonal flow management • How will any partial project contribute to ISF – M&I or agriculture
<p>Structural/Operations Complete Wapatox conveyance modifications</p>	<p>Summary: Include project Timeframe/Priority: 0-5 years</p> <ul style="list-style-type: none"> • Include Selah-Naches diversion consolidation • Save around 70 cfs in streamflow 	<p>Summary: Include project Timeframe/Priority: Early implementation, high priority</p> <ul style="list-style-type: none"> • Currently in motion • Provide instream flow improvement • Base level with potential for more 	<p>Summary: Include project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Haven't exactly figured it out as to what is being propose • Discussions between BOR and Naches-Selah ID

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Structural/Operations Subordinate power at Roza dam during spring	<p>Summary: Include project Timeframe/Priority: 0-5 years</p> <ul style="list-style-type: none"> • Requires change in agreements 	<p>Summary: Include project Timeframe/Priority: High priority</p> <ul style="list-style-type: none"> • Also include Chandler • Money and agreements • Doesn't hurt districts 	<p>Summary: Include project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Large benefits to fish • Issue of repayment to BPA
Structural/Operations Subordinate power at Chandler during spring	<p>Summary: Include project Timeframe/Priority: 0-5 years</p> <ul style="list-style-type: none"> • No KID contract like at Roza • Need to address KID canal management issues 	See above	<p>Summary: Include project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Less benefit than Roza subordination • Occurs less often • Easier than Roza subordination
Structural/Operations Kennewick Irrigation District Pump Exchange	<p>Summary: Include project Timeframe/Priority: 0-5 years for Phases 1 and 2</p> <ul style="list-style-type: none"> • Phase 1 – Red mountain (OK) • Phase 2 – Edison (need final cost information) <ul style="list-style-type: none"> ○ Ecology has committed \$15 million ○ Operation costs 	<p>Summary: Include project Timeframe/Priority: Medium priority, subject to benefit cost analysis and feasibility</p> <ul style="list-style-type: none"> • Not necessarily expensive • USBR moving forward • Information need – fish benefit in diversion reach and downstream • Potential benefit with climate change 	<p>Summary: Include project however need more information Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Ecology has committed \$15 million (\$65 million) • High cost • Dubious benefit to fish • Needs to be clearly designed/defined
Structural/Operations Kittitas Reclamation District Main Canal and South Branch Canal Modifications	<p>Summary: Include Project Timeframe/Priority: 0-10 years</p> <ul style="list-style-type: none"> • Provides flow flexibility 	<p>Summary: Include project Timeframe/Priority: Near term, high priority</p> <ul style="list-style-type: none"> • Water in Manastash Creek 	<p>Summary: Include project, however Main Canal needs value engineering and tunneling should be last resort for South Branch</p>

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		<ul style="list-style-type: none"> Integrate with Wymer 	<p>Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> KRD Main Canal <ul style="list-style-type: none"> Big opportunity Needs value engineering Stabilize flow regimes (steelhead) – if savings water tributaries South Branch <ul style="list-style-type: none"> Very expensive Exhaust other options before tunnel
Structural/Operations Pump Stations on Yakima River to Serve KRD or Manastash Creek Water Users	<p>Summary: Include Timeframe/Priority: Not identified</p>	<p>Summary: Include project, however dependent on KRD canal Timeframe/Priority: Near term, high priority</p> <ul style="list-style-type: none"> Manastash Pump Station is dependent on KRD canal 	<p>Summary: Include project, however not on Manastash Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> Pump Station on Yakima River <ul style="list-style-type: none"> Manastash not a good option (omit from projects list) Depends on the purpose <ul style="list-style-type: none"> High benefit KRD High cost/benefit to Manastash
Structural/Operations Roza Dam Roller Gate Modifications	<p>Summary: Already in process Timeframe/Priority: This fall</p> <ul style="list-style-type: none"> Not part of package since happening? 	<p>Summary: Include project Timeframe/Priority: High priority</p>	<p>Summary: Timeframe/Priority:</p> <ul style="list-style-type: none"> Extraneous to package
Structural/Operations Keechelus to Kachess Pipeline	<p>Summary: Include, but needs further evaluation</p>	<p>Summary: Include subject to benefit cost analysis</p>	<p>Summary: Include project</p>

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	<p>Timeframe/Priority: 0-5 years</p>	<p>Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Medium amount of information available, subject to benefit analysis • Evaluate this combined with pumping of Dead storage in Kachess • Data needs – volume and refill • Simple and cheap? • Ability to improve flows 	<p>Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Best if gravity • If pumping, cost/benefit likely too high • Should be done earlier in season to avoid pumping • Large benefits to fish • Fits integrated package
Structural/Operations Modify Flip Flop	<p>Summary: Include but dependent on storage project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Flip-flop dependent on storage solution <ul style="list-style-type: none"> ○ More normative flow on Yakima and Naches (target flows) 	<p>Summary: Include project Timeframe/Priority: High priority</p> <ul style="list-style-type: none"> • Modify flip-flop (high priority with Wymer and Keechaes to Kachess pipeline, other ways?) <ul style="list-style-type: none"> ○ Keechaes to Kachess pipeline ○ Thorp pump with Wymer ○ Operational 	<p>Summary: Timeframe/Priority:</p> <ul style="list-style-type: none"> • Modify flip-flop – strike <ul style="list-style-type: none"> ○ Projects will address, etc.: <ul style="list-style-type: none"> ▪ Keechaes and Kachess ▪ KRD pump exchange ▪ Gravity feed at Cle Elum ▪ Wapatox ▪ Groundwater scenario
Structural/Operations Utilization of Dead Storage Pumping from Kachess and Cle Elum	<p>Summary: Need to look at more closely Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Dead storage – needs <ul style="list-style-type: none"> ○ Not dependent on legislation ○ Need to understand how much water and cost ○ Integrate with fish passage 	<p>Summary: Include Timeframe/Priority: Near term, medium priority</p> <ul style="list-style-type: none"> • Lower outlet pipe • Utilization of dead storage (information need?) 	<p>Summary: Include project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Don't need to do it every year • High potential option for crisis management • Question on how much dead storage at Cle Elum versus Kachess

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	study		
Structural/Operations Gravity feed from Cle Elum to downstream (Roza)	<p>Summary: Include project in conjunction with Wymer Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Needs to be in conjunction with Wymer 	<p>Summary: Include but need to determine feasibility Timeframe/Priority: 20+ years, low to medium priority</p> <ul style="list-style-type: none"> • Lots of tunneling • Need to determine feasibility • Need to compare pumping versus gravity • Blends with Wymer • Need to determine cost 	<p>Summary: Include but look for other options Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Fish issue, not TWSA • Hugely expensive • Only solves too much water problem, not too little water problem • Look at side-by-side other options • Potential power benefits
Structural/Operations Lower outlet pipe at Cle Elum	<p>Summary: Consider with dead storage analysis Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Trap/haul, more lower outlet study in conjunction with fish passage (lower outlet – how much lower?) <ul style="list-style-type: none"> ○ How much of total AF dead storage? ○ Cle Elum River Effects? ○ Lake effects? 	<p>Summary: N/A Timeframe/Priority: N/A</p>	<p>Summary: Include as part of dead storage project Timeframe/Priority: N/A</p> <ul style="list-style-type: none"> • Need information about how this project provides benefits • Make this part of Dead Storage option
Storage Wymer Dam	<p>Summary: Include project Timeframe/Priority: 11-20 years</p> <ul style="list-style-type: none"> • Wymer – (Thorp, gravity) and Columbia River Pump 	<p>Summary: Include project Timeframe/Priority: High priority</p>	<p>Summary: Include project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Continued interest • Expensive

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	<ul style="list-style-type: none"> ○ Reduces upper Yakima flows ○ Reduces flip-flop effects ○ Power generation potential ○ Need to better define operation costs and fisheries impacts (look at Wapato reach) 		<ul style="list-style-type: none"> ● There is a minor trade off in terms of Llmuma Creek spawning
Storage Bumping Lake Enlargement, Small (250,000 AF)	<p>Summary: Include but more information on impacts to species is needed Timeframe/Priority: 11-20 years</p> <ul style="list-style-type: none"> ● Need more information on impacts to bull trout, spotted owl, old growth forests ● Would need to address politics in order to implement project 	<p>Summary: Include but consider similar projects instead Timeframe/Priority: Near term, high priority</p> <ul style="list-style-type: none"> ● Provides 250,000 AF of storage ● A similar project might work if this project cannot be implemented ● Some storage needed in the Basin ● Concern about redd inundation and owl habitat ● USFS – wilderness and recreational facility 	<p>Summary: Include however there must be environmental benefits in rest of package to gain full workgroup support Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> ● Not popular in the environmental community ● High value in Naches ● Environmental benefits elsewhere must be persuasive
Storage Cle Elum Dam 3-foot Pool Raise	<p>Summary: Include project Timeframe/Priority: 0-10 years</p> <ul style="list-style-type: none"> ● Flow easements affect shorelines development ● No USBR condemnation authorization (need authorization for legislation) ● Cheap storage/only 15,000 AF 	<p>Summary: Include project Timeframe/Priority: High priority</p> <ul style="list-style-type: none"> ● If implemented, will need to address land owner issues ● Understand why was this not done in the past? 	<p>Summary: Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> ● Already authorized ● Land owner opposition ● Reengineer fish passage options

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	<ul style="list-style-type: none"> • Prime location <ul style="list-style-type: none"> ○ Fish and wildlife neutral or beneficial 		
Storage Other Naches Basin Storage Projects	<p>Summary: Include – further evaluation Timeframe/Priority: 0-5 years</p> <ul style="list-style-type: none"> • Not dependent on YRBWEP legislation • Continue to identify and evaluation potential • Priority for projects on tributaries <ul style="list-style-type: none"> ○ #1 – off channel ○ #2 – intermittent ○ #3 – on channel 	<p>Summary: Further evaluation Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Site identification still needed – Low priority • Operational flexibility • Water availability 	<p>Summary: Include projects Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • Group unsure of what this consists of • General interest • Look at water to capture, then where to store
Storage Pine Hollow Off-channel Storage and Watershed Restoration Program	<p>Summary: Include project Timeframe/Priority: 11-20 years</p> <ul style="list-style-type: none"> • Collaborate with Yakama Nation • Describe how much water used, instream flow, whose water to fill, who operates 	<p>Summary: Include project Timeframe/Priority: Near to mid term, medium priority</p> <ul style="list-style-type: none"> • Provides 24,000 AF of storage • Less support • Some benefits to TWSA • Concern that project only benefits one user • Go forward with evaluation of best fill option – near term • Offstream storage provides drought relief • Location for additional gains and recovery 	<p>Summary: Timeframe/Priority:</p> <ul style="list-style-type: none"> • Doesn't help TWSA • Localized benefit • Lack of Yakama Nation and other support

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		<ul style="list-style-type: none"> • Flow modification • Aquifer infiltration • Tributary enhancement • Linked with other storage • Question on operations – what can be done when? 	
Storage Direct Pump with Storage Facility in the Yakima Basin	<p>Summary: Include, however reevaluate based on other projects included in integrated package Timeframe/Priority: 11-20+ years</p> <ul style="list-style-type: none"> • Flexibility (new supply/fish flow) • Keep on list until it is known what other projects are included in integrated package • Have questions on: operation cost, fisheries impact, effects on interstate compact and international agreements 	<p>Summary: Include project, however not a priority due to cost Timeframe/Priority: Low priority</p> <ul style="list-style-type: none"> • High power costs • Columbia flow issues 	<p>Summary: Include project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • High interest by County <ul style="list-style-type: none"> ○ Prefer to other reservoir options • Problematic economically <ul style="list-style-type: none"> ○ High O&M costs ○ Irrigation alone couldn't afford ○ Not supported by some constituents • Less environmental damage than other options • On balance, close to bucket-for-bucket with Columbia River • Columbia River issues
Storage Direct Pump without Storage to an Irrigation Canal	<p>Summary: Include, however reevaluate based on other projects included in integrated package Timeframe/Priority: 11-20 years</p> <ul style="list-style-type: none"> • See "Direct pump with storage" • Issues with water availability in 	<p>Summary: Include project, however it is a low priority Timeframe/Priority: Long term, low priority</p> <ul style="list-style-type: none"> • Columbia flow availability • Expensive 	<p>Summary: Include project Timeframe/Priority: Not identified</p> <ul style="list-style-type: none"> • See "Direct pump with Storage Facility in the Yakima Basin" • Direct pump without storage may be even more attractive to environmentalists

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	July/August <ul style="list-style-type: none"> • Operational reliability 		
Market Reallocation and Transfer	<p>Summary: Include project Timeframe/Priority: Short and long term ST – conservation and water bank LT – could help reduce storage need</p> <ul style="list-style-type: none"> • Would provide limited water today • May have greater potential in the long term • Not dependent on YRBWEP legislation (ongoing) 	<p>Summary: Include project Timeframe/Priority: Short, mid, and long term, ongoing; high priority</p> <ul style="list-style-type: none"> • Legislation required for some aspects • How much water? Non-proratables cut-back • No surplus storage capacity • Only in crisis • Social and legal issues • Integrate with conservation projects 	<p>Summary: Include project Timeframe/Priority:</p> <ul style="list-style-type: none"> • If more district to district, could increase volumes • Storage – increase market options • Enhanced conservation essential to making district to district transfers work – tight system • Need to address conversion of lands to residential areas • Low impact tool – need to optimize • Need to determine legal impediments • If individual costs; no cost to county • Exempt well issue • If senior districts can be kept whole, could open up the transfers <ul style="list-style-type: none"> ○ Already have short term capability. The real benefit is from a systemic long-term market ○ Contract issue with Reclamation could be impediment; however,

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			Federal law strongly encourages market transfers
Other Information Needs	<ul style="list-style-type: none"> • Need decision-making process along with robust supply and demand analysis (in and out of stream) (what can entities get by with on drought year?) • Planning for future supply needs to consider impacts of groundwater use (exempt wells, groundwater/surface water interactions and water rights priority) • Better water balance: demands, supply; drought; need accounting system. • How big is demand for groundwater during drought years? • Need to see linkages/integration • Evaluate reach by reach (see conservation and applies to structural/ops) • Need demand numbers to compare with project options (robust supply/demand analysis) 		<ul style="list-style-type: none"> • Need model to see how projects are connected (written in structural/operations)