ROZA
IRRIGATION DISTRICT

To: Board of Directors

From: Scott Revell, District Manager
Sage Park, Policy Director

Date: May 7, 2024

Re: Drought Response Measures & Draft Operating Plans

Attachments

1. Water Allotment Pooling fact sheet

May 3, 2024 Water Supply Update

- ✓ USBR issued a water supply forecast of 54% for Roza and the other proratable irrigation entities, which is down from 63% in April. The low end forecast of 46% is down from 51% in April.

- ✓ Water storage: Water in storage is 72% of average.

Reservoir storage status on May 3, 2024		Capacity (Ac. Ft)
Keechelus	52%	157,800
Kachess	44%	239,000
Cle Elum	51%	436,900
Bumping	83%	33,960
Rimrock	73%	198,000
Total	55% of capacity	1,065,400

- ✓ Precipitation for the water year is 82% of average to date.

- ✓ Snowpack is 62% of average in the upper Yakima River mainstem basin (down from 71%) and 70% of average in the Naches River basin (down from 74%), which represents a modest decrease from early April.

- ✓ The 2024 water year is tracking similarly to the 1994 water year.

- ✓ The next water supply forecast will be issued on June 6th.

54% & 50% Draft Supply Operating Plan Options & Baseline Assumptions

The draft plans have been prepared with options with and without a ten-day mid-season shutdown after prorationing is implemented by USBR.

Supply	Shutdown	Delivery Info (all plans assume prorationing begins on May 15)	Projected Season End Date
54%	Yes 10 days	3.6 gpm/ac (Late May to June 15) 4.0 gpm/ac (June 16 to 30) 4.3 gpm/ac (July 1 to Aug 30) 4.0 gpm (Sept 1 to Sept 15) 3.6 gpm/ac (Sept 16 to end)	Oct 3
54%	No	3.6 gpm/ac (Late May to June 15) 4.0 gpm/ac (June 16 to June 30) 4.3 gpm/ac (July 1 to Aug 31) 4.0 gpm/ac (Sept 1 to Sept 15) 3.6 gpm/ac (Sept 16 to Oct 2)	Oct 2
50%	Yes 10 days	3.6 gpm/ac (Late May) 4.0 gpm/ac (June 1 to June 15) 4.3 gpm/ac (July 1 to July 31) 4.0 gpm/ac (Aug 1 to Aug 15) 3.6 gpm/ac (Aug 16 to Sept 15) 3.3 gpm/ac (Sept 16 to Oct 3)	Oct 3
50%	No	3.6 gpm/ac (Late May to July 15) 4.0 gpm/ac (July 16 to Aug 15) 3.6 gpm/ac (Aug 16 to Oct 4)	Oct 2
46%	No	3.0 gpm/ac (Late May to June 15) 3.3 gpm/ac (June 16 to June 30) 3.6 gpm/ac (July 1 to Aug 15) 3.3 gpm/ac (Aug 16 to Sept 30)	Sept 30
2015 44%	Yes 21 days	1.8 gpm/ac (June 1 to July 13) 3.0 gpm/ac (July 14 to Oct 12)	Oct 12 (w/ 47% Oct. allocation)

- All scenarios assume 10,330-acre feet of leased water will be added into the system, if more water were to be available from purchases/leases, days could be added to the season or peak season deliveries could be increased slightly.

- May 15 is the proration date used for planning purposes. **The prorationing date is not known yet and will not be known until just prior to prorationing occurring.** May 15 to

June 1 is still a reasonable date range. The earlier the date used for planning purposes the more flexibility the District will have to adapt if conditions deteriorate.

- Delivery restrictions will begin upon prorationing. There is no advantage to implementing delivery restrictions or a shutdown prior to prorationing, See also pages 8 & 9.

- The plans can be adjusted to anticipate a two-week peak period, which typically occurs between July 1 to early August.

- At the April meeting the Board was supportive of running the latter two weeks of September at minimum flows, which staff can discuss further at the May Board meeting.

- The District also has a 46% supply plan without a shutdown, which has been prepared as a point of comparison in case the water supply forecast were to drop further, and it is too late in the season to implement a shutdown.

- All scenarios assume that a grower cannot defer a portion of their allotment early in the season for use later in the season, due to tracking issues and inability to guarantee sufficient flows later in the season to make the deliveries if the District's supply is exhausted, which is why pooling with other growers can be important.

- All plans assume 2,000-acre feet of Roza drain pump back supplementation, which is added to the Roza water budget.

- Losses due to evaporation and seepage are virtually the same whether the canal is operated at normal flows or reduced flows. The operating efficiency, when measured as a percentage, is reduced when the canal is operated at lower flows.

- The peak period is assumed to be 62 days from June 15th to August 15th. Water usage begins to drop around August 15th as harvest progresses, temperatures drop and the days get shorter.

- Potential additional water supply in October is not included in the water budget. An October water allocation will not be known until mid-September and will be dependent on late season precipitation. The water year ends on September 30. Days can be added to the season if an October water allocation occurs.

- If the water supply forecast were to fall below 50% in the months ahead, which is possible, staff will work up a revised operating plan, which will likely mean fewer days running in September. The District gamed out several scenarios for supplies less than 50% in January 2023 which were reviewed in detail with the Board of Directors.

- The typical irrigation season is 203 days (April 1 to October 20). Season end dates are approximated.

- 1.8 gpm/ac/day is the very lowest the system can run and is far less than typical July & August drought year operations. 7.5 gpm is a typical peak.

Experience has shown that operating at a fixed delivery rate and adjusting the canal to meet that rate has resulted in much better water management in prior droughts, instead of keeping the canals at a set level and adjusting deliveries.

The Watermaster will operate the Main Canal to eliminate operational spills if at all possible. Operations spills totaled about 1,589 AF in 2001 and 3,143 in 2005. The Wasteway 5 Re-regulation reservoir which came online in 2017 should help to eliminate most operational spills.

Roza typically uses around 80% of its 375,000-acre foot water right each year, not including 18,000-acre feet of senior March water. The proration amount, at this point 54%, is based on the water right (375,000 AF). The equation is further complicated because delivery restrictions are not implemented until after proration begins (see page 8).

Supplemental Water Leasing/Purchase Update

Water with senior priority dates (pre- May 10, 1905) has been obtained as follows:

Transfers have been processed for 10,330-acre feet and approved through the state department of Ecology for:

- ✓ 6,500 acre feet from the Selah Mixes Irrigation District
- ✓ 3,830 acre feet from landowners in the Sunnyside Valley Irrigation District

Staff is working with another senior right holder (Suncadia) on a lease/purchase of 830 AF at $300/AF which would total $249,000. This water comes from three tributaries and each has different time of use restrictions than the SVID or SMID water and is subject to curtailment, meaning that it would need to be used somewhat earlier in the season.

There is another 200+ acre foot block of water that may also be available, which would total $60,000 +/-.

The water budget has been built 6,500-acre feet from SMID and 3,830-acre feet from SVID (note that the proration amount issued on May 3rd reduced the amount available through the SVID leases which were processed when supply was 63% to account for the SVID water right being 31% proratable). More water may be obtained but the process is on ongoing and staff's approach has been to avoid building a water budget that relied on water leases which may not occur.

Mid-Season Shut Down Potential & Operational Issues

During prior droughts Roza implemented mid-season shutdowns when the supply has been forecast to be below 60%. About 750-acre feet are estimated to go unused in order to drain and refill the canals to implement a midseason shut down.

The 2024 growing season for some crops is somewhat (e.g. several days) ahead of schedule and is not as far ahead of schedule as was the case in 2015.

There is not set duration for shutdowns, it really boils down to how much water is desired to be moved to other parts of the season and how the impacts the affected crops can be managed by growers (e.g. forage crops and cherries).

A range of options are provided below. The amounts of water that can be moved to either the end of the season or to peak periods are as follows:

Length of Shutdown	Net AF (after draining/filling)	Days added in Sept/Oct at minimum flows (or could be added to peak period)
8 days	5,650	7
10 days	7,250	9
12 days	8,850	11
14 days	10,450	13
16 days	12,050	15

Mid-season shutdowns and early season curtailment occurred in prior drought years as follows:

Storage control	Year	Shut down began	Shut down ended	Days off	End of season date
April 15	2015	May 10	May 31	21	October 12
May 25	2005	April 6	April 29	23	October 1
June 6	2001	May 8	May 29	21	September 24
June 1	1994	May 16	June 6	23	September 8
June 13	1993	N/A	N/A	N/A	October 4
May 16	1992	N/A	N/A	N/A	September 16

Staff recommends that, if a shutdown is implemented, that the District stop diverting water within two days of storage control/prorationing in order to allow for notice to growers to adjust their operations before water is shut off. Generally, earlier in the week is better for logistical planning , but it can begin on any day of the week.

Other related operational items of note:

- To the extent possible, gravity lines and pump tubes will be kept charged in order to speed up the restart process.

- Coffer dams in the Main Canal will not prevent water from draining out of the Main Canal via seepage.

- Pump 1 deliveries in east Selah will cease during any shutdown even if power is being generated by USBR in Terrace Heights.

- Permanent wooden check boards have been installed at Pump 5 and Pump 6 to raise the pools so that the pumps can operate at minimum flows.

- Roza can allow groundwater to be pumped into flow meter deliveries during a shutdown, with review by the Engineering department. The flow meter propeller will need to be removed by Roza crews.

- All field staff will switch to a 4-10 work schedule during the shutdown through the re-start.

- Weather patterns during a shutdown could change its duration. Unusually hot weather could require it to be shortened, while very wet and cool weather could allow it to be lengthened by a couple of days

Several members of the maintenance crew have experience as Ditchriders and can be used to expedite the re-start by charging lateral pipes, setting meters and setting weirs. The canal will be monitored on a round the clock basis and significant overtime will result during a re-start.

The Watermaster inspects the Main Canal prior to a re-start and monitors the concrete lined sections for heat caused heavy damage during the shutdown.

Staff has prepared an aggressive work list that could be undertaken if a shutdown becomes necessary. Most work will be oriented around the Main Canal, lateral clean out and mowing. A shut down provides a unique opportunity to get ahead of both mowing and spraying.

Terrace Heights Irrigation District water will be shut off if Roza implements a shutdown. The THID Board has been notified that a shutdown is possible if the water supply drops.

If a shutdown is required, staff will maintain close coordination with USBR staff to try to avoid a shutdown coinciding with coming off of reservoir control and losing access to water during re-priming (which takes several days).

The District could save one Endothall treatment with a shutdown ($120K +/-) if it occurs after May 20 +/-. The chemical has been purchased, but it could be used in 2025.

Tentative Restart Schedule (if a shutdown is implemented)

- Day 1-Begin diversions at 11 miles on the Main Canal at 7 a.m.
- Day 2-Begin deliveries at Pumps 1, 2, 3, 4, 5 and 6 and along the Main Canal to Wasteway 4.
- Day 3-(by evening) begin deliveries on Pump 7, 8, 9, 9A, 10 and along the Main Canal to Wasteway 5.
- Day 4- Filling the lower half of the Main Canal.
- Day 5- Begin deliveries on Pumps 12 through 17 and along the Main Canal below Wasteway 5.

The schedule above assumes no major problems occurring during the process, such as a windstorm and the need to remove tumbleweeds, a major leak or a power failure at the pumps.

Key Variables In Every Drought

Several factors affect the operating plans:

- The storage control and prorationing dates (often the same date but not always);
- Water supply forecasts will change monthly until August and can improve or worsen;
- Weather variability in June can greatly impact demand in June and affect management of the available water supply after June;
- Precipitation for the remainder of the season;
- The amount of supplemental water available through purchases/leases;
- Prioritization of either days in the season or amount of water delivered to farms during the June 15th to August 15th peak period;
- The amount of water made available through a mid-season shut down (if pursued;)
- Canal efficiency levels will fluctuate (higher inefficiencies as flows in the canals drop);
- Weather events during the drought (heat dome, rain, cold front, etc.);
- Crops are often 10 days +/- early or late & sometimes more;
- The amount of moisture in the ground at the start of the irrigation season.

Storage Control

- Occurs when the sum total of all five reservoirs see net outflows (some reservoirs may still be filling, but the amount of those which are filling is less than those which are releasing water)
- The flow target at Parker, which is located immediately downstream of Sunnyside Dam, is being met with releases of stored water from the reservoirs.
- On occasion the river can go onto storage control and then come off of storage control if temperature warm quickly and the snow melts off rapidly and the river flows then increase above the flow targets.
- The flow targets are established in Title XII of the 1994 federal YRBWEP legislation.
- A temperature dip causes natural flows to decrease as the melt off stops or slows.
- A longer-term temperature dip (more than a week or so) can be adverse if stored water is then required to be released in order to meet the target flow at Parker and then temperatures warm and accelerate the snow melt resulting in higher natural flows...when this condition happens, if storage control has been called the proratables cannot access the additional water in the river without burning down their buckets more quickly (which will cause them to run out of water earlier in the season). When this occurs the proratable miss out on favorable natural flows. USBR tries to avoid this from happening by calling a new storage control date.

Prorationing

- Prorationing only affects the junior water right holders (May 10, 1905 priority dates).
- Can occurs when some of the reservoirs are still filling, but combined inflows exceed combined outflows.
- Occurs when the flow target at Parker is being met with released of stored water from reservoirs.
- If Roza shuts down its system soon after prorationing occurs the storage control date will likely be pushed out further because demand is reduced during the shutdown.

Natural Runoff Proportion (NRP)

- Based on voluntary cooperation
- USBR holds deliveries to available supply (as measured at Parker) by dividing supply proportionally
- Compares irrigation demand to natural flow in the river.
- Junior and senior water rights holders voluntarily share in the shortage through voluntary reductions to squeeze out a bit more time before prorationing occurs.
- NRP can forestall prorationing by several days or more in some conditions.
- NRP affects junior and senior water rights holders.
- Conservation projects in the senior districts make it more possible for voluntary diversion reductions during these conditions.
- NRP can complicate river operations.
- When NRP ends prorationing begins. USBR is trying to hold NRP into late May in 2024.

Comparison to 2015 Water Supply Forecasts

2015 Monthly Supply Forecast	Adopted Forecast	Low End Forecast
March	73%	58%
April	60%	45%
Late April	54%	Not done
May	47%	35%-38%
Late May	44%	Not done
June	44%	37%
July	44%	41%
Mid July	46%	Not done

Low end forecasts in 2015 were based on 80% of avg precipitation for the remainder of the water year (through Sept 30).

Drought Protocols & Priorities

In 2016 the District undertook a detailed review of its operating protocols following the 2015 drought. Those proposals were updated in late 2018 and again in January 2023 to account for additional system efficiencies, crop mix changes, and increased on-farm efficiencies.

If grower losses increase with each day the season ends early in September, there is little advantage to not using 100% of the available water budget because any unused water will stay in the Total Water Supply Available (TWSA) pool for all water users in the Yakima River basin in the next water year, not just the Roza water users. Roza will receive 35.7% of carried over water, because the proratable entitlements which have a May 10, 1905 priority date are allotted as follows based on their proportionate share (by water right with that priority date):

- 35.7% Roza Irrigation District
- 32.9% Wapato Irrigation Project
- 31.8% Kittitas Reclamation Project (totals more than 100%)

50,000+ acres, which is 70%+ of the District, are currently planted in crops which require late season water, such as tree fruits, hops, grapes, blueberries and triticale.

Implementing shutdown(s), pump backs, leases and delivery restrictions as listed in the matrix below in order to fulfil the following priories:

- Priority 1 is to run the season to September 30 if possible
- Priority 2 is to run the season to September 15 if possible
- Priority 3 is to run the season to September 5 if possible

Drought Management Authorizations

When the forecast water supply is below 70%, the District Manager is authorized to implement measures to extend the irrigation season, including but not limited to:

1. Restricting deliveries;
2. Extending the pooling deadline beyond June 1st for transfers between Roza growers;
3. Activating the Roza pump backs;
4. Implementing a system shut down immediately if storage control occurs before May 15;
5. Advocating for issuance of emergency drought well permits.

Roza Water Allotment Pooling

By policy, the pooling deadline is June 1st. In prior drought years the Board has extended the pooling date. There are administrative impacts which will result, but they are comparatively minor. A one-page fact sheet on pooling has been emailed to water users and posted on the District's website to encourage pooling between Roza farmers.

Roza Drought Fund & State Drought Relief Funds

The District had approximately $4.1 million in the drought emergency fund in 2023 (without state funds). Expenditures have been approved as follows:

$1,950,000 SMID purchase for 2024 season
$1,203,900 SVID lease/purchases (up to 5,000 AF)
$ 330,000 Wasteway Re-regulation reservoir liner repairs
$ 300,000 Cloud seeding feasibility
$ 200,000 Drought year related operations expenses (Overtime, fuel, mobile pump expenses, electricity for pump backs, etc.).
$3,983,900 Total to date

Roza requested $2,500,000 from the Legislature in January 2024. $200,000 was appropriated.

Staff has been in contact with the Department of Ecology and has applied for just under $900K in emergency drought funds via reimbursement. The state has just under $4M in the state drought account. State law limits the maximum award to 25% to any one entity. Prior droughts had a 50% state match. Federal funding sources are also being examined. $18M was appropriated in 2015 to the state drought fund for the 2015-16 biennium ($9M per year).

The Wasteway 5 Re-regulation reservoir liner repairs were authorized from the District's drought fund in 2023 because the reservoir has proven to be an effective water management tool during drought years, even more so than initially expected. The reservoir allows operational spills to the be captured and reused that would have otherwise run down Wasteway 5 to the Yakima River.

To date, the Board has expressed a desire to replenish the drought fund over a few years rather than in one year as occurred in 2016, and to potentially reprogram some other revenues to the drought fund.

Emergency Drought Relief Groundwater Wells

Historically, the District's position has been that groundwater wells are an issue between the affected land owners and Ecology. Growers with drought relief wells have stated to staff that they are a critically important drought management tool in very low water years and that the ability to turn them on is the single most important issue.

The groundwater usage must be mitigated under the terms of a 1999 administrative settlement between USBR, Ecology and the Yakama Nation. During prior drought years the State of Washington paid 100% the mitigation costs. Mitigation is not be required to be real time and potentially could occur after the irrigation season. Ecology staff has also stated to District staff that 75% of the mitigation costs will be required to be paid by the groundwater users.

Roza staff and Ecology staff have been meeting on this issue since June 2023. Ecology staff have stated that in 2024, Ecology will allow users to use drought wells up to 75% of their Roza water supply with the purchase of mitigation water. Ecology's planning assumption is that Roza will be able to provide 50% water supply in 2024. If the actual supply is less than 50%, Ecology will adjust their estimates.

110 emergency drought wells were permitted in the Yakima basin in 1994, (some were reissued in 2001 and 2005) and over 90% are within the Roza district. They total an estimated 11,000-to-12,000-acre feet of permitted water and were estimated by Ecology to pump approximately 7,700-acre feet in 2015. Wells dated to 1994 do not need to be mitigated further if the landowner previously paid mitigation fees to USBR according to Ecology staff.

Roza Actions to Date

- Low flow check boards were installed in the Main Canal in February at milepost 19.5 and 33.8 to raise the pools during low flows in anticipation of reduced diversions.

- The District's website is being updated daily, which has helped to get information out to water users quickly.

- Water user updates have been sent via email to nearly 800 water users after each water supply forecast have been issued.

Wheeling Water via Roza's Canals

Several growers inquired in 2015 about using the Roza's canals to wheel non-Roza water under a variety of scenarios. The District would need to retain a portion of the wheeled water to account for evaporation and seepage. 20% of the water wheeled was retained by the District in 1994, 2001 and 2005.

- **Well water put into the Main Canal for carriage to other delivery points along the Main Canal**- Some significant administrative tracking complications result. Water cannot be wheeled via the Main Canal during a shutdown or if the irrigation season ends early because there is not enough water in the canal to convey the wheeled water.

  Doing so has occurred in prior droughts with a license agreement and Roza's retaining 20% of the water for conveyance.

- **Well water put into the Main Canal for carriage to other delivery points on pump laterals**- Carriage of water to pump laterals would also trigger the electrical pumping cost recovery issue in addition to increased administrative tracking complications.

  Two such situations were approved in 2015 with a license agreement during the shutdown. The flowmeter propeller would need to be removed by Roza crews.

- **Well water put into a lateral for carriage to other delivery points on the same laterals (or pipe)**-A written request has been received from a small group of growers to do so in the Moxee area. They have requested the ability to do so both during a shutdown (if applicable) and to supplement during the rest of the season.

  The Watermaster states that running groundwater into the lateral canal to another delivery point on the same lateral canal can be accomplished without excessive water tracking burden or canal level juggling if it occurs at a continuous flow.

- **SVID, or other surface water, into the Main Canal**-Doing so has not been permitted in the past or in 2024, in part because the District cannot guarantee that flows in the Main Canal will be sufficient to carry the water to a point where it can be delivered. Also, the Roza Board did not want Roza growers to be in competition with the District to obtain water, which would cause increased costs for all water users.

  Carriage of water to pump laterals would also trigger the electrical pumping cost recovery issue, and Roza would need to retain a portion to account for evaporation and seepage.

  During the 2015 drought several growers requested approval for Roza to carry the users' SVID water with the grower assuming the risk of flows in the Main Canal not

allowing for carriage to be effective (e.g. reduced diversion, mid-season shut down or an early end to the season). Doing so requires approval from the SVID Board and appoint of diversion change.

- **Drain water pumped back into the Main Canal by a Landowner for delivery to the Landowner's other downstream delivery points (AKA "Red Water")**- This was attempted in 1994, 2001 and 2005 and caused a significant administrative tracking burden, which while helpful to some individual growers, and may have not been a net positive to the District overall. Growers do not have a right to drain water without a permit from the District. For many decades the District has not issued permits for use of drain water, but has not denied use of drain water for appurtenant lands along drains. Exporting drain water could result in the denial of water to other current users downstream in the drain. This concept was not approved at the April meeting, in part due to potential water quality issues.

Using a USBR canal to transport non-USBR water could require a wheeling agreement to be executed between Roza and USBR which involves an administrative approval from the USBR Regional Director in Boise, and takes a few weeks to execute according to USBR staff. If desired, the Board could authorize the Manager to execute wheeling agreements in the event they become necessary.

Permanent Crops in the Roza Irrigation District

The false claim that permanent crops were not supposed be grown on the Roza project goes back at least to the 1977 drought. Staff has researched this issue exhaustively over many years and has found no supporting documentation of a permanent crop prohibition or limitation.

- ✓ Roza's 1921, 1935 and 1953 contracts with the U.S. Bureau of Reclamation do not prohibit or limit growing permanent crops. Roza water users voted on the USBR contract in 1953 at an election which included the exact language in the contract and there was no mention of permanent crops in those documents.

- ✓ The 1935 act of Congress which authorized the Roza Division, did not contain any prohibitions or limitations to growing permanent crops. The 1997 and 1994 Yakima River Basin Water Enhancement Project (YRBWEP) acts of Congress do not mention limitations or a prohibition on planting permanent crops within the Roza project.

- ✓ There is no mention in the 1945 Consent Decree, which established the prorationing water allotment system in the Yakima Basin, following a lawsuit by SVID against KRD during the 1941 drought whereby Roza (and others with May 10, 1905 water right priority dates) would receive a reduced amount of water in drought years. Roza had a senior water right prior to issuance of the Consent Decree in 1945.

- ✓ The exhaustive Yakima River water right encyclopedia prepared by USBR's Yakima Project Superintendent C.R. Lentz in 1974 of every USBR water right in the basin make no mention of a permanent crop limitation or prohibition. The Lentz report is the seminal document concerning water rights in the basin and was relied on heavily by the Court during the Acquavella adjudication of the surface water rights in the basin.

- ✓ Roza's water right(s), and the 1996 settlement agreement and the 1996 Conditional Final Order, have no mention of permanent crops in those documents.

- ✓ Neither the Roza handbook which the District gave to landowners for decades makes no mention of a permanent crop prohibition.

Wine grapes and juice grapes, of which there are currently over 18,000 acres, are an example of permanent crops that use less than the three-acre feet of Roza allotment. Conversely, some annual crops, which while more easily fallowed, use more than three-acre feet of water.

Those with May 11, 1905 water right priority dates or later are reduced to zero allotment in drought years. Growing permanent crops on land with post-May 10, 1905 water is very risky because the water supply for those water rights is cut off entirely in drought years.

The U.S. Bureau of Reclamation's Yakima Project was planned to include more surface water storage, which would have provided for more firm water supply for the proratable districts (Roza, KRD, part of Wapato, part of SVID and part of Yakima-Tieton).

Grower Feedback during the 2015 Board Meetings

- Wheel lines do not run on ten points per forty acres
- Hay grower(s) would like to shut off for a week and double up for the following week
- If a shutdown is necessary, as much advance notice is requested as is possible. The more the better.
- Hay grower(s) would like to take twice as much water for half as long in order to get one good cutting of hay.
- A water pooling match up list would be helpful for growers looking to pool.
- A federal emergency declaration should be pursued.
- Reclamation Reform Act extension for filing forms should be requested.
- Wheeling well water via Roza's canal would be helpful
- Saturday or Sunday water delivery would be helpful.
- Could a system be set up to notify the district of weekend water changes?
- Post the emergency drought relief well info on the Roza website as it becomes available
- If there is a shut down, when does it happen? Only shut the canal down if it is absolutely necessary, in order to not harm mint growers.
- Mint growers may grow less corn or different kinds of corn.

Overall Water Management/Growing Info

- 1.8 gpm/ac/day in May can work in cool weather but not if the temperature is over 90s degrees or if it is windy.
- 10 days @3.3 gpm/ac = 16.5 days @ 1.8 gpm/ac.
- At about 35% supply growers will be focused on keeping their plants alive vs growing a crop for that year.
- *In a 35% supply year April water will be forgone and move to extend the season to Sept 21.
- Shallow rooted drip irrigated plants (hops, blueberries, apples, trellised cherries) are less drought resilient.
- The crops below represent 83% of the District.

Grapes (15,000 +/- acres or 20% of the District)

- The canopy on grape vineyards fills out by mid-June and the plants require more water

Tree Fruits (26,000 +/- acres or 36% of the District)

- New high-density plantings are $60K to $70K per acre

Forage/dairy (9,500 acres or 13% of the District- w/ dairy footprints & all types of corn)

- Nitrate management of dairy waste will not allow fallowing in some cases
- Below 35% water supply corn for forage will not be grown in many cases

Hops (9,300 acres or 13% of the District)

- No water in September is catastrophic for hops because they dry out.

Blueberries (1,600 acres or 2% of the District)

- Cooling is crucial
- Bushes must be drip irrigated constantly
- In 90-degree weather blueberry bushes will die within 3 days of not having water
- New plantings are $40K to $50K per acre
- New plantings are 2-year-old bushes and a light crop can be harvested 3 to 4 years after planting. The bush does not mature and reach full production until the plant matures at age 8.

Yakima Basin Drought Summary

Year	March supply forecast	Overall season water supply	Pro-ration start date	Storage control date	Roza season end date	Notes
1941	N/A	44%	N/A	June 8	Oct. 15	Roza first blocks came on line in May 1941. Pre-1945 consent decree & prior to TWSA. Diversion avg. 50 cfs.
1973	N/A	80%		May 1	Sept. 20	Very dry season with major rain in September which skewed the overall season upward
1977	6%	70%	April 1	April 1	Sept. 30	Initial forecast later raised to 15% to include return flow
1979	None	100%		April 20	**Aug. 29**	No March estimate. 46% in Aug. due to water stranded in Cle Elum due to gate malfunction
1992	100%	58%	May 16	May 16	**Sept. 16**	March is an estimate in '92-'94. April estimated at 86%
1993	48-60%	71%	June 1	June 13	Oct. 4	March is an estimate. April estimated at 52%
1994	58-68%	37%	May 1	June 1	**Sept. 8**	April estimated at 53%. **23 day shutdown**
2001	38%	37%	May 1	June 1	**Sept. 24**	29%-30% forecast supply in May and June. Transfers added 5%. **21 day shutdown**
2005	34%	42%	April 6	May 25	Oct. 1	34% through May. 38% in June. Transfers added 8%. **23 day shutdown**
2010	77%	100%	N/A	July 3	Oct. 19	Low of 71% in May. Very unusually supply recovery.
2015	73%	47%	April 15	April 15	Oct. 10	Full reservoirs and very little snow. Low of 44%. Transfers added 1.2%. **21 day shutdown**.
2019	90%	70%	June 3	June 7	Oct. 17	77% in April. Low of 68% in August
2023	86%	73%	June 1	June 1	Oct. 18	Low of 72%

- ✓ Storage control is the date at which control of the river changes from natural flow to releases of stored water from the reservoirs by USBR to fulfil their contract obligations and to meet minimum the flow targets at Parker established in the 1994 federal YRBWEP law. Storage control typically occurs in late June/early July in full supply years. Pre-1973 storage control dates were estimated by USBR using the modern methodology.

- ✓ Pro-rationing can occur before storage control when diversion demands affect the reservoirs (e.g. the reservoirs are filling but filling less than they would have with the incidental in-stream flow releases). When USBR declares pro-rationing the amounts of water in the district buckets for the year is set.

- ✓ Estimated supply during droughts in 1926 (42%), 1930 (73%) & 1931 (55%) on the estimated storage control date. Cle Elum reservoir & the Roza project were not yet built. Each predates the TWSA system established in the Consent Decree in 1945. Overall season supply is through September.

Roza Drought Response Measures Matrix

Water Supply	Delivery Restrictions*	Shut Down(s)	Roza Pump backs	Leases	End season before Sept. 30	Notes Oct 20 +/- is typ. in full yrs.
80%	Yes	No	No	No	No	Restrictions on some days
75%	Yes	No	Yes	No	Possibly	Season ends early
70%	Yes	No	Yes	Possibly	Possibly	Season ends early Leases optional-varies
65%	Yes	No	Yes	Possibly	varies	Leases optional-varies
60%	Yes	Possibly	Yes	Possibly	varies	Leases optional-varies
55%	Yes	Probably	Yes	Yes	varies	7,000 AF from leases & PB
50%	Yes	Yes (15+ days)	Yes	Yes	varies	7,000 AF from leases & PB
45%*	Yes	Yes -2	Yes	Yes	Oct 2*	7,000 AF from leases & PB
40%*	Yes	Yes -2	Yes	Yes	Sept 27*	7,000 AF from leases & PB
35%*	Yes	Yes -2	Yes	Yes	Sept 19*	7,000 AF from leases & PB
30%*	Yes	Yes -2	Yes	Yes	Sept 3*	See note #2
25%	Yes	Yes -2	Yes	Yes	August 11*	See note #2
20%	Yes	Yes -2	Yes	Yes	August	See note #2
15%	Yes	Yes -2	Yes	Yes	August	See note #2
10%	Yes	Yes -2	Yes	Yes	Yes	See note #2
5%	Yes	Yes -2	Yes	Yes	Yes	See note #2

Planning Assumptions:

1. The proration date in 40% supply scenarios and below is assumed to April 1st . The storage control date greatly influences the measures above.

2. The water budgets for the scenarios above include 8,900 AF in leases (which differs from the table above), 2,000 AF of Roza pump backs (PB) which capture canal seepage in concrete lined canal sections and pump it back into the Main Canal.

3. Losses have been 32% +/- of diversions during the 2001, 2005 & 2015 droughts. Losses are the sum of evaporation, seepage, and operational spills. Losses should be somewhat lessened with the Wasteway 5 re-reg reservoir coming online in late 2017 and additional concrete sealing.

2021 Roza Crop Census

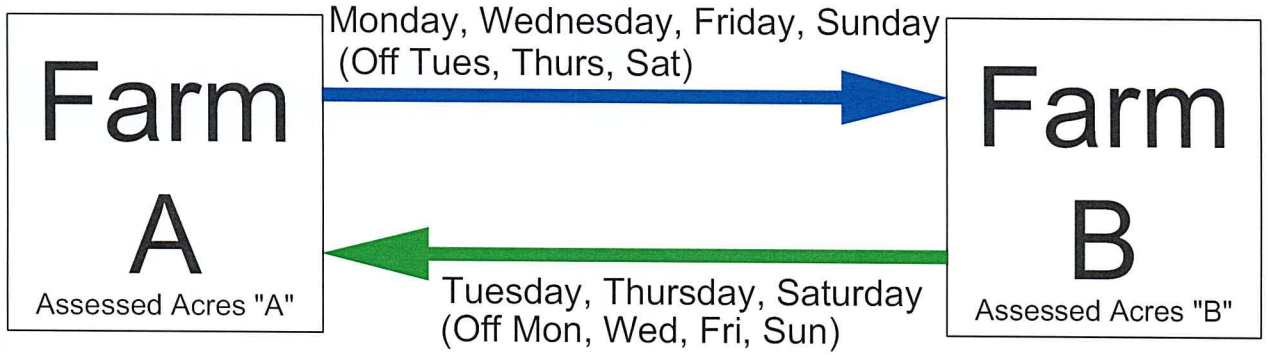
	Acres 2015	Acres 2021*
Irrigation Method		
Rill	1592.50	646.30
Drip	19980.00	26772.12
Sprinklers-Portable	8206.26	8187.58
Sprinklers-Permanent	41236.81	33360.09
No System	1457.64	3550.92
Total Assessed Acres	72473.21	72517.01
Crops		
Tree Fruit		
Pears	1288.90	1362.2
Soft Fruit	869.65	425.5
Cherries	4179.70	4138.9
Apples	20076.95	19893.4
Sub Total Tree Fruit	26415.20	25820.0
Asparagus	135.30	158.5
Grapes	7179.30	4861.9
Wine Grapes	11006.70	10168.6
Hops	6822.70	9318.7
Forage	4470.70	3152.05
Small Grains	345.05	150.6
Blue Berries	1190.50	1598.5
Row Crops	399.20	149.6
Corn (all types)	3439.20	6369.1
Drought Fallow	2509.70	
Transition Fallow	N/A	1276.3
Fallow	2362.59	2851.44
Mint	416.20	263.5
Yards (lawns)	1325.97	2144.22
Pasture	3513.20	2243.95
Other(Processing Facilities)	941.70	869.75
Total Crops	72473.21	72517.01

Any ground double cropped denoted by first planted crop

* Numbers Complied by Ditch Rider Beat 07/2021

ROZA
IRRIGATION DISTRICT

Assessed Acres for A + Assessed Acres for B = AB Pool



- Pooling allows for higher flow rates during a drought year when Roza's water supply is prorated.
- During prorationing, flow rates are calculated by the total amount of assessed acres in the pool.

Example:
Farm "A" has 40 acres of assessed water and Farm "B" has 40 acres of water.

If the prorated delivery amount is set at 21 points per acre (5.5 Gpm/Acre), The maximum flow rate for each farm would be 0.49 CFS.
If Farm "A" and "B" Pool their acres for a total pool of 80 acres, The max flow rate would be 0.98 CFS

Doing so allows Farms "A" and "B" to alternate irrigation days, utilizing a higher flow rates than if they did not pool together.

- Pools can include several parcels or several farms.
- Pool members must designate one person as the individual who is authorized to order the water for that pool.
- Call or email the Roza office to authorize water orders for your pool per pool members agreed upon irrigation schedule.
- All parties must notify Roza staff of participation in pool.