PRAIRIE CREEK LABS

Voluntary Agreement water purchases

VA purchases are too costly, in the wrong years, and with little water when it is needed most

Prepared for the Delta Flows Coalition by Prairie Creek Labs, October 2026

Summary

1. VA water purchases would run $910m over the $782m budget over the 8-year term; 80% of total spend projected to be permanent purchases.

2. Fair Ranch, the first large permanent purchase, is enforceable only to 5,000 AFY; even with every acre idled it averages about 2/3 of its 16,000 AFY target, driving permanent water costs to about $1,200/AF.

3. VA water purchase costs would be about 200% of current market prices, which hover around $800 in Critical years and $350–$450 in all other years.

4. Fixed-price purchases: pay about 30% over market prices.

5. Only 6% of VA-purchased water volume is delivered in Critical years, when the ecosystem needs it most.

1. VA water purchases would run about $910m over the $782m budget, and 80% of the spend would be permanent purchases

The Voluntary Agreements (VAs) add Delta outflow partly by buying water. The Final Draft Bay-Delta Plan sets the volumes for three programs: fixed-price purchases from public water agencies, purchases at market prices, and permanent state purchases. How much is bought depends on the water year type, the Department of Water Resources' (DWR) classification of each year as Wet, Above Normal, Below Normal, Dry or Critical. It ranges from 68,000 acre-feet (AF) in a Critical year to 236,500 AF in an Above Normal year (Figure 1). The VA MOU budgets $782m for these purchases over its 8-year term: $490m for permanent purchases, $208m for fixed-price purchases and $84m for market purchases.

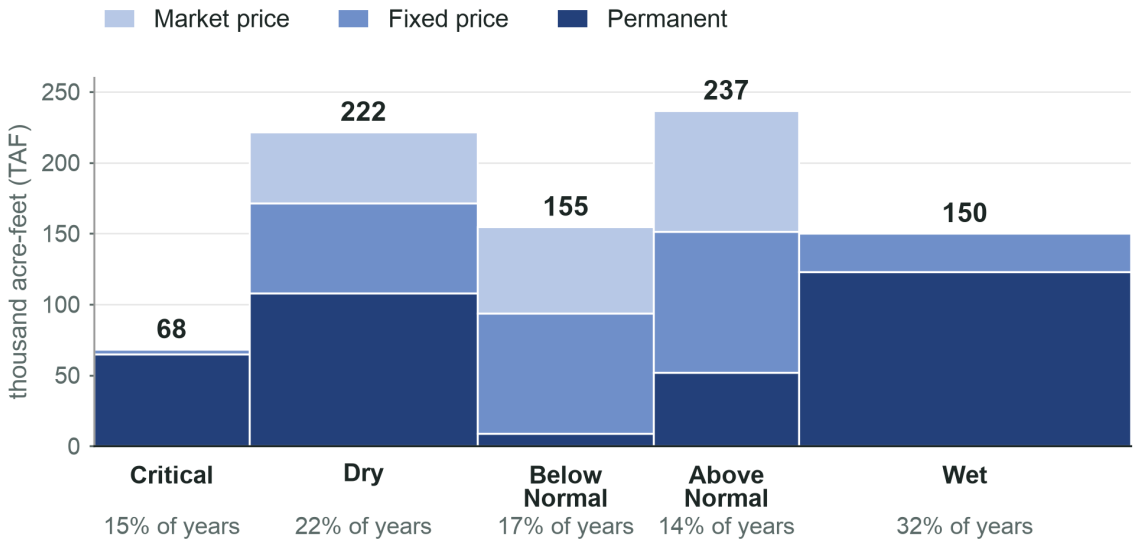


Figure 1. VA purchases in a year of each type, by program, in thousand acre-feet. Each bar is as wide as the share of years of that type. Sources: Final Draft Bay-Delta Plan, Aug 2026, § 4.4.9.3 p. 75 (volumes); HRL Global Agreement App. 1 Table 1b (share of years).

We priced each year's purchases at what water has actually sold for in that kind of year. Market purchases are priced at the median north-of-Delta sale of that year type (the price bands in Section 3), fixed-price purchases at $500/AF, about the rate the budget implies, and permanent purchases at what the State paid for Fair Ranch, the first large permanent purchase (Section 2). Weighted by volume and by how often each year type occurs, the purchases would cost $136m a year, 2.0 times the $67m implied by the Staff Report's $400/AF modeling assumption.

Over the 8-year term the three programs would cost $1.69B against the $782m budget[1], about $910m over (Table 1). The permanent program is almost all of the overrun. Bought at Fair Ranch's price, its volumes would cost $1.38B, 2.8x the $490m budget line and more than 80% of the total.

Program	VA MOU budget	Priced at	Expected 8-year cost
Market price	$84m	Median north-of-Delta sale of the year type	$105m
Fixed price	$208m	$500/AF	$205m
Permanent	$490m	Fair Ranch's price, $17,031 per AF of yearly yield	$1,384m
Total	**$782m**		**$1,694m**

Table 1. Expected cost: the Plan's volumes in each year type × share of years × price; market and fixed-price purchases for 8 years, permanent purchases as a one-time cost per AF of yearly yield. Budget: VA MOU App. 3 Table 4, the market line including the EBMUD addendum. Sources: Final Draft Bay-Delta Plan, Aug 2026, § 4.4.9.3 p. 75; HRL Global Agreement App. 1 Table 1b; Prairie Creek Labs VA purchase cost model.

2. Fair Ranch is enforceable only to 5,000 AFY and averages about 2/3 of its 16,000 AFY target, driving permanent water costs to about $1,200/AF

In June 2026 DWR agreed to pay $179.95m for Fair Ranch, a 7,521-acre ranch in Yolo County (Grant Agreement 4600016769). The deal works in three steps:

- **The State buys forbearance:** the owner gives up part of its Sacramento River Settlement Contract water each year, permanently.
- **Rice acres are idled:** the ranch leaves rice fields unplanted.
- **The water is left in the river:** the water the rice would have used stays in the river for Delta flows.

The contract credits only the water the idled crop would have consumed. Water credited = acres left unplanted × AF per acre for the crop that would have been grown. The rates come from the December 2019 DWR/Reclamation Water Transfer White Paper, Table 2-1, frozen into the contract by Exhibit D-2. Rice, the ranch's main crop, earns 2.9 AF an acre. The contract sets a Minimum Volume of 5,000 AF a year and an Expected Volume of “up to 16,000” AF a year (Exhibit D § 2).

[1] This budget from MOU. The Draft BDP has a different budget number of $925m that refers to the same purchase volumes, but it is not sourced or broken out in any detail so we have used the MOU budget numbers for these programs and volumes. Note also that the Market Price line includes the EBMUD $20m from their modification of the MOU.

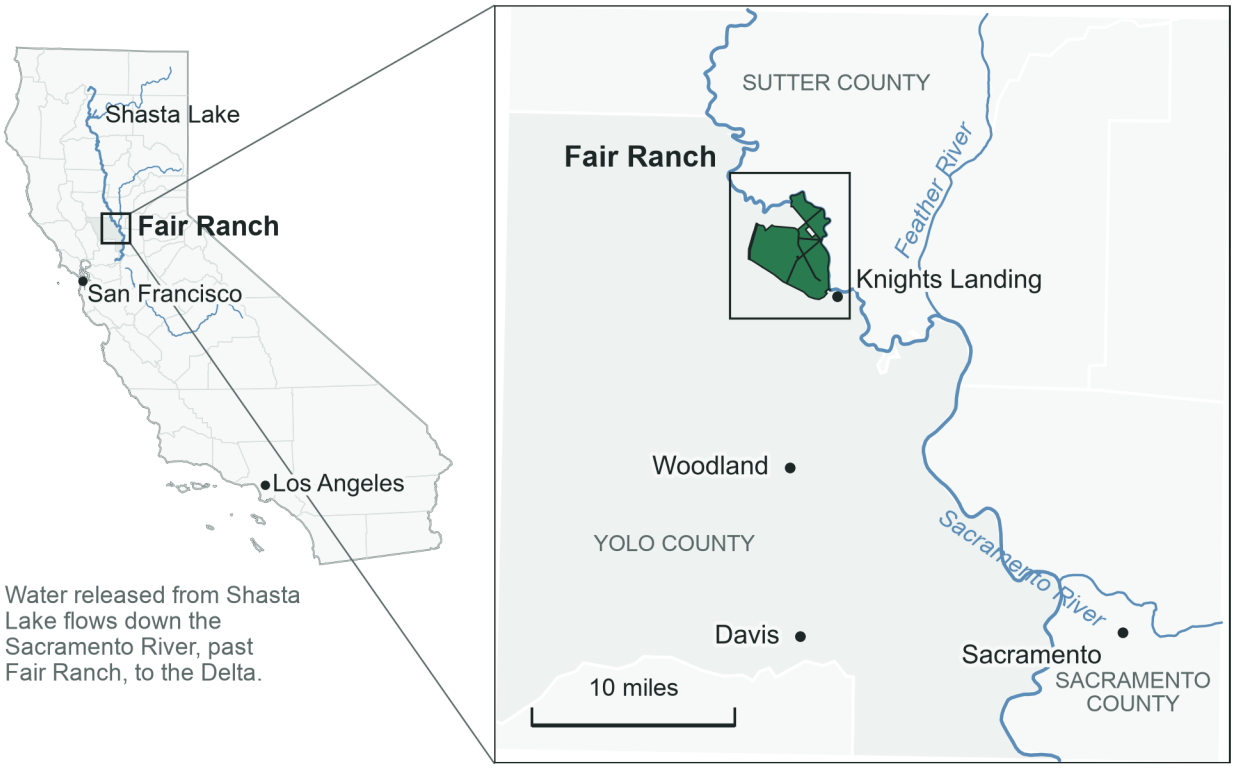


Figure 2. Fair Ranch location. The ranch lies on the Sacramento River in Yolo County, just upstream of Knights Landing and about 25 miles northwest of Sacramento. Water released from Shasta Lake flows past it to the Delta. Figure 3 shows the ranch's crops.

What Fair Ranch delivers

We built a model that applies the contract's counting rules to the ranch's own crops and water supply, and replayed water years 2000–2024 as if the contract had been in force (Figure 4). Even with every eligible acre idled, the ranch is credited 11,690 AF in a Wet year, 10,746 AF in Above Normal, Below Normal and Dry years, 8,767 AF in a Shasta Critical year and 5,968 AF in a Drought Protection Program year. It never reaches 16,000. Averaged over the mix of years, it delivers 10,566 AF a year, 66% of the target.

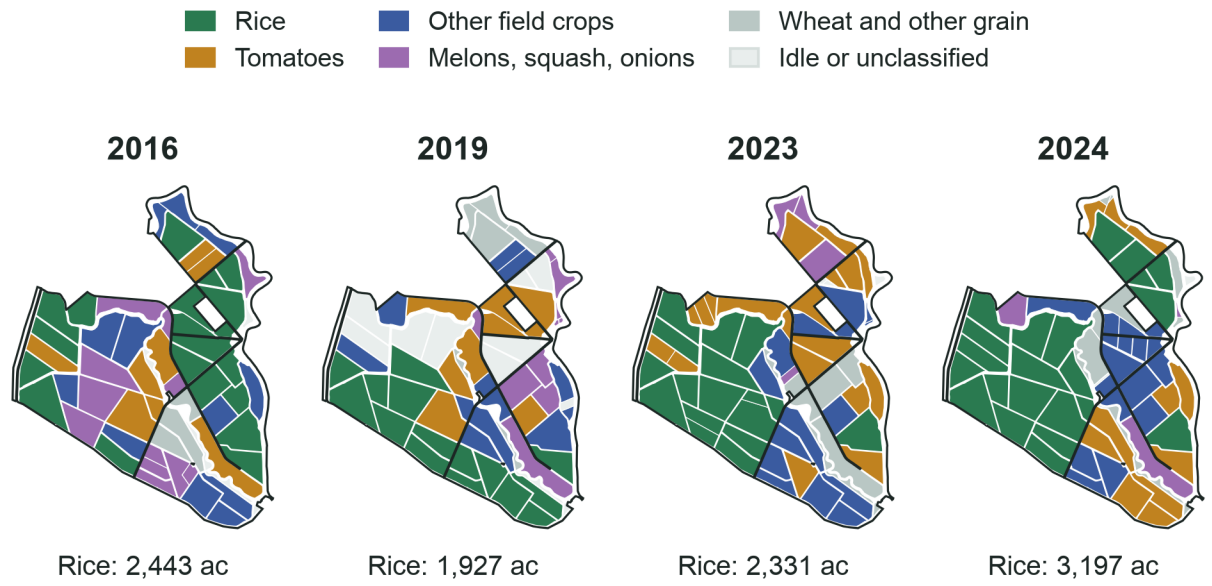


Figure 3. Crops on Fair Ranch in the four baseline years. The mix shifts a lot from year to year: rice ranged from 1,927 to 3,197 acres. That is why the model uses an average. DWR marks its 2024 map provisional.

Two obligations the ranch already carries come out of that credit. Under Reclamation's Drought Protection Program the owner gives up a further 7,136 AF of its supply in the driest years, leaving 51% of it; that happens about 0.66 years in ten while the program's first phase runs to 2035. And the RD 108 / Yolo County MOU (§ 5.a) expects about 1,400 AF of the ranch's fallowing to go to the Healthy Rivers and Landscapes (HRL) Program in Above Normal, Below Normal and Dry years. Counted the way that program counts rice (4.3 AF an acre), that is 326 acres, which would otherwise earn 944 AF of the contract's credit. Blending Shasta Critical and Drought Protection Program years at the rate the program occurs, an average Critical year yields 7,536 AF.

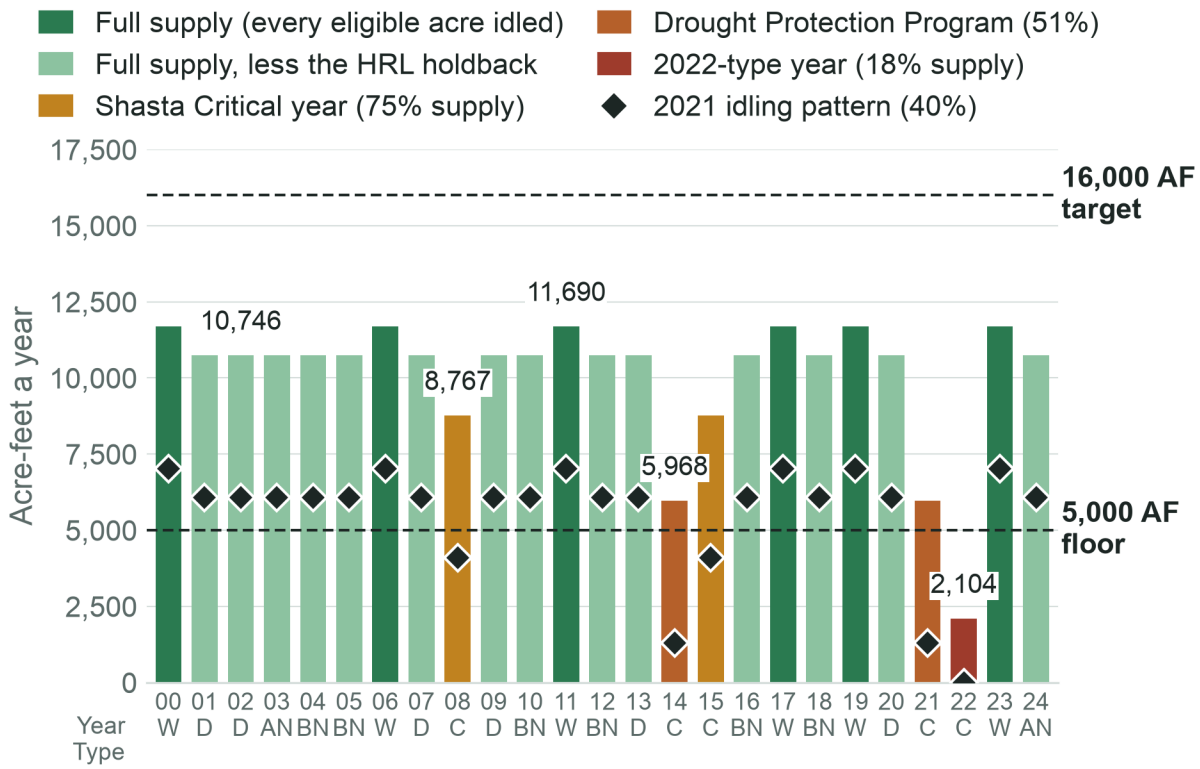


Figure 4. Credited volume in each water year 2000–2024, as if the contract had been in force. 11,690 AF in Wet years, 10,746 in Above Normal, Below Normal and Dry years (after the HRL holdback), 8,767 in Shasta Critical years, 5,968 in the Drought Protection Program years 2014 and 2021, 2,104 in 2022. The target is reached in no year. Diamonds: the 2021 level of effort. Source: Prairie Creek Labs compliance model, central case.

Key model inputs:

- **Every eligible acre idled.** The owner only idled 40% of the ranch in its 2021 transfer.
- **Crop baseline.** The crop mix of 2016, 2019, 2023 and 2024, the full-supply years without a transfer; rice at 2.9 AF an acre; no groundwater pumping in non-transfer years.
- **Drought Protection Program and HRL holdback.** Both are incorporated.
- **RD 108's Tract 6 left out of totals.** Its supply provisions have no enforcement mechanism above 5,000 AFY (Appendix A).
- **2022-type years.** A 2022-type year (2,104 AF, below the floor) is not in the average because it is rare. If one year in 25 were like 2022, as in 2000–2024, the average would be 10,299 AF and the price $1,223/AF.
- **Contract cost.** The full $179.95m, annualized as a perpetuity at 7% real.

What the contract enforces (or fails to enforce)

Only the 5,000 AF floor has a remedy with force:

- **The 16,000 AFY target is unreachable.** The Fair Ranch property alone delivers at most 11,690 AF, in a Wet year. The contract defines the Expected Volume as "up to 16,000 acre-feet" that "could under historic conditions be made available" (§ 2.b).
- **Above 5,000 AF, enforcement is a meeting.** Between 5,000 and 16,000 AF the owner owes "economically feasible efforts" (§ 6.b.iii), and a shortfall leads to a "meet and confer" on corrective actions "that are economically feasible and within Owner's reasonable control" (§ 13.b).
- **Below 5,000 AF, DWR may, but need not, take the property.** Only two misses in any ten years count, and then DWR has "the contractual right, but not the obligation" to take the property (§ 13.c). These are DWR's "sole and exclusive remedies" (§ 13.d).
- **Tract 6 make-up is not enforceable.** RD 108 need only "jointly and in good faith coordinate" its adjoining Tract 6 with the ranch (§ 6.b.iv), and Exhibit D-2, the contract's water accounting, has no method for counting Tract 6 water (Appendix A).

Grant Agreement 4600016769, Exhibit D (Instream Flow and Forbearance Agreement): Expected and Minimum Volumes, § 2; economically feasible efforts, § 6.b.iii; Tract 6, § 6.b.iv; shortfall meet and confer, § 13.b; Remedy Trigger Event, § 13.c; sole and exclusive remedies, § 13.d. Exhibit D-2 (water accounting) never mentions Tract 6.

What it costs

To compare a one-time payment with yearly purchases, we convert it to the equal payment made every year, forever. At 7%, $179.95m is the same as $12.6m a year in real terms. Spread over 10,566 AF, that is $1,192 per AF a year. Had the ranch delivered 16,000 AF, it would be $787. And Fair Ranch charges this price every year, including Above Normal and Wet years when water transfers, if they happen, are typically priced in the low $300s per AF.

We annualize at 7% real, the federal rate for public investment (OMB Circular A-94) and the rate the VA budget itself implies: $490m for 81,680 AF a year of permanent water is $5,999 per AF of yearly yield, against water worth about $420 a year at market prices. It is also consistent with a 3% real risk-free rate plus about 4 points for drought-correlated deliveries, weak enforcement and illiquidity.

3. VA water purchase costs would be about 200% of current market prices

Transfer prices have been steady. The water year type sets the market price; within a year type, prices barely move over time. Dry-year water sold for $463/AF in 2009 and for $449 to $472 in four sales in 2020, after adjusting for inflation. Half the Critical-year sales by north-of-Delta sellers in 2015, 2021 and 2022 fall between $680 and $931. The median sale of each year type is its price band: $816/AF in a Critical year, $453 in a Dry year, $412 in a Below Normal year and $320 in an Above Normal year (Figure 5).

Across all three programs, the VAs would pay $816/AF on average for water that would cost $404 at market prices: $136m a year against $67m, about 2.0 times as much. Each acre-foot is priced at the median sale of its year type, weighted by volume and by how often each year type occurs. Market purchases pay the market price by definition. Fixed-price purchases pay about

30% more (Section 4). Permanent purchases, at Fair Ranch's price, pay 2.7x. Permanent purchases are half the water bought but 71% of the cost.

The VAs would pay more per acre-foot than water has sold for in every year type (Figure 5). Counting everything bought in a year of each type, the VAs would pay $1,620/AF in a Critical year, against a market price of $816; $817 against $453 in a Dry year; $504 against $412 in a Below Normal year; and $583 against $320 in an Above Normal year. In a Wet year they would pay $974, when no north-of-Delta sale is on record at all. Permanent purchases drive these prices.

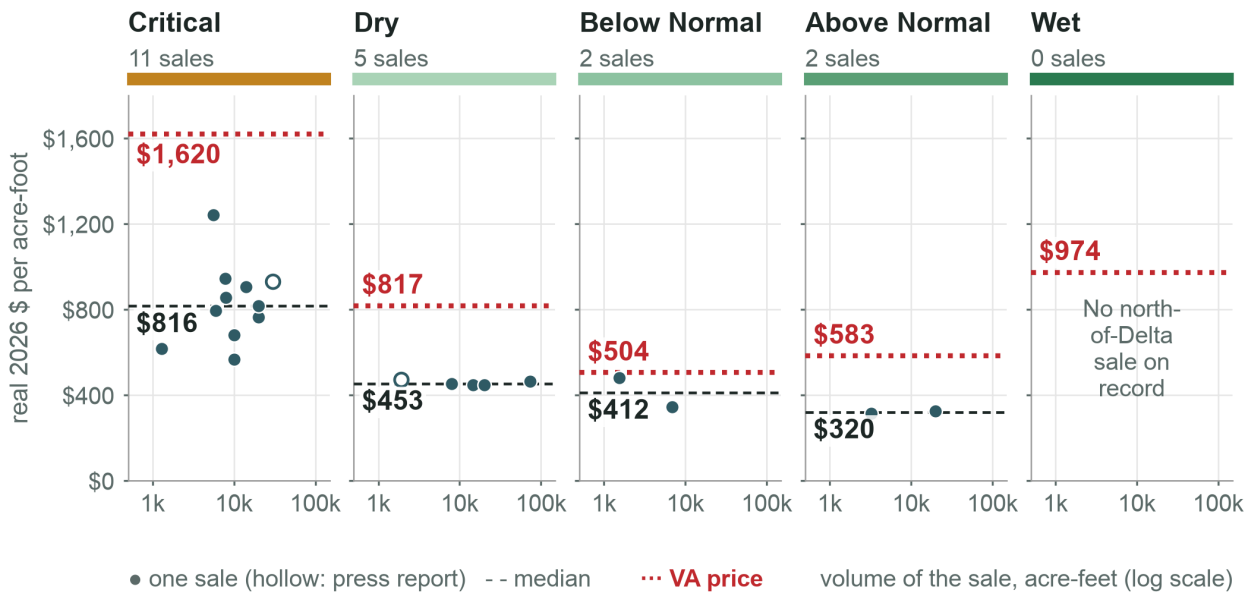


Figure 5. Every north-of-Delta transfer price on record by water year type (dots), the median (dashed line, the price band) and the VA price in a year of that type (red dotted line): everything the VAs buy that year, market at the median, fixed price at $500/AF and permanent at Fair Ranch's annualized price, divided by the AF bought. 20 north-of-Delta seller sales, 2009–2026, at the point of transfer, real 2026 $ (CPI-U). The Below Normal and Above Normal bands rest on two sales each. No north-of-Delta sale has happened in a Wet year, so the Above Normal price stands in for it, an assumption. Weights: share of years 0.15 / 0.22 / 0.17 / 0.14 / 0.32 (HRL Global Agreement App. 1 Table 1b). Sources: DWR transfer records, State Water Board approvals, seller board minutes and agreements; Prairie Creek Labs transfer database.

Fair Ranch against the market

Weighted by how often each year type occurs, the market price is $439/AF. Fair Ranch's $1,192 is 2.7x that. Even at the full 16,000 AF the price would be $787, 79% above the market. The missing volume explains 54% of the premium; the price itself explains the rest.

Fair Ranch also costs more than water bought in the driest years. $1,192 is 46% above the $816 Critical-year band, and above every north-of-Delta sale on record but one, a 2015 Critical-year sale by South Sutter Water District. Counting only Critical years, when the ranch delivers 7,536 AF on average, Fair Ranch water costs $1,672/AF.

The comparison holds without the perpetuity calculation. As a one-time price, the State paid $17,031 per AF of yearly yield ($179.95m for 10,566 AF a year). The VA budget sets aside $490m for permanent purchases expected to yield 81,680 AF a year on average, or $5,999 per AF. At Fair Ranch's price, the Plan's permanent volumes would cost $1.38B, 2.8x the $490m budget line.

The first permanent deals

DWR's first three awards under its Instream Flow Water Purchase Program, announced on May 28, 2026, use 47% of the $490m permanent budget for 12% of the 65,000 AF of Critical-year water the Plan expects from permanent purchases:

Award	Price	Share of $490m	Water in a Critical year
Fair Ranch	$179.95m	37%	7,536 AF in an average Critical year
Upper Swanston Ranch	$14.28m	3%	None: water is due only in Dry, Below Normal and Above Normal years (about 3,300 AF each, 39,600 AF in total)
Westside Agriculture	$35.83m	7%	Usually none: about 3,000 AF only when State Water Project allocations exceed 20%, true in one of five Critical years since 2000
Together	**$230.06m**	**47%**	**About 7,536 AF, 12% of the 65,000 AF the Plan expects**

Table 2. DWR Instream Flow Water Purchase Program awards and project descriptions, May 28, 2026. Fair Ranch volumes: Prairie Creek Labs compliance model, central case. Westside: replay on final State Water Project allocations 2000–2024.

The Plan says any permanent volume that is not available “must be fulfilled through additional market price water purchases” (p. 75). No budget line covers it, and it falls in the years water costs the most.

4. Fixed-price purchases pay about 30% over market prices

Fixed-price purchases are one of the two parts of the Plan's Public Water Agency (PWA) Water Purchase Program, which the HRL participants must provide (Final Draft Bay-Delta Plan § 4.4.9.3, p. 75); the other part is market-price purchases. Market-price water is bought each year at whatever transfer water sells for. Fixed-price water is paid for out of a set budget line instead: the VA MOU sets aside $208m for “additional water purchase with fixed price” over its 8-year term (App. 3 Table 4). The Plan fixes the volumes by year type: 3,000 AF in a Critical year, 63,500 in a Dry year, 84,500 in a Below Normal year, 99,500 in an Above Normal year and 27,000 in a Wet year.

Most of this water is not bought from sellers. The Plan takes 10,000 AF from Sacramento Valley sellers north of the Delta in Dry, Below Normal and Above Normal years, and the rest from Central Valley Project, State Water Project and Westlands Water District contractors south of

the Delta, which it says are “likely to be provided through additional reductions in Delta exports” (App. B.1 Table B.1-6): water the projects would otherwise have pumped out of the Delta is left in it. That is about 90% of the fixed-price volume, and all of it in Critical and Wet years. The VA MOU's Table 1b splits the program the same way.

Spread over the Plan's fixed-price volumes and the 8-year term, the $208m budget line comes to $506/AF. That is higher than every north-of-Delta sale on record outside a Critical year (the highest was $480). It is 12% above the Dry-year band, 23% above the Below Normal band and 58% above the Above Normal band, which also stands in for Wet years. Weighted by when the program buys, the market price is $386, and the fixed price pays 31% more (Figure 6).

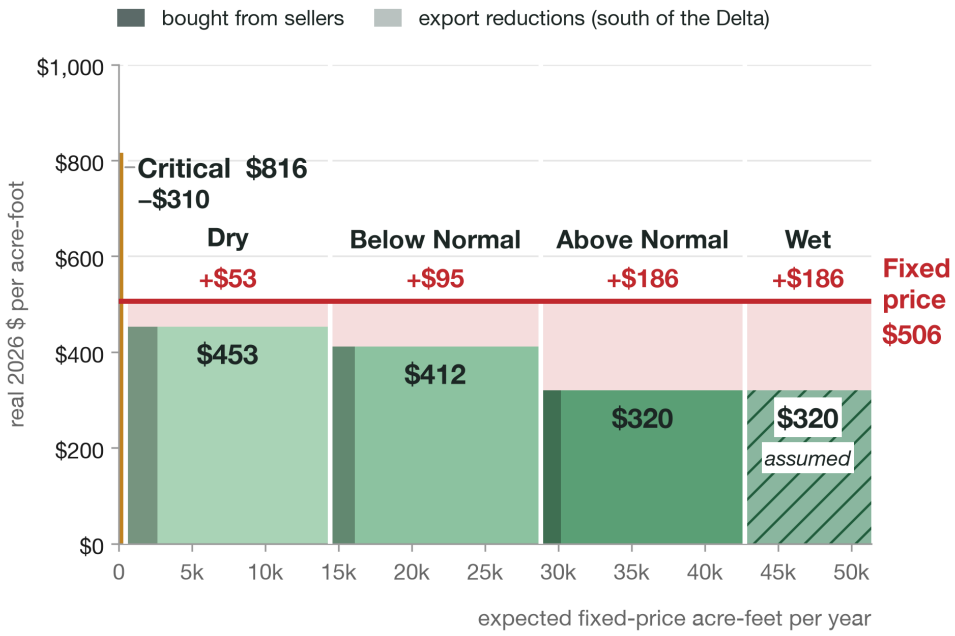


Figure 6. The fixed price against market prices, the median north-of-Delta sale of each year type (Figure 5). Bar width is the fixed-price volume bought in an average year; the darker part of each bar is the volume bought from sellers, the lighter part the volume expected from export reductions south of the Delta. Shading above the bars is the overpayment. No north-of-Delta sale has happened in a Wet year, so the Wet bar (hatched) uses the Above Normal price, an assumption. Sources: VA MOU App. 3 Table 4; Final Draft Bay-Delta Plan p. 75 and App. B.1 Table B.1-6; VA MOU App. 1 Table 1b; Prairie Creek Labs VA purchase cost model.

5. Only 6% of VA-purchased water is delivered in Critical years, when the ecosystem needs it most

On the VA planning basis, 15% of years are Critical (HRL Global Agreement App. 1 Table 1b, which matches CalSim II's 1922–2003 record). In a drier world, this has changed: Over the last 20 years, 2006–2025, 25% of years were Critical. Yet weighted by volume and by how often each year type occurs, only 6% of the water the VAs buy would be bought in Critical years (Figure 7). Nearly half, 49%, would be bought in Above Normal and Wet years, when rivers are high.

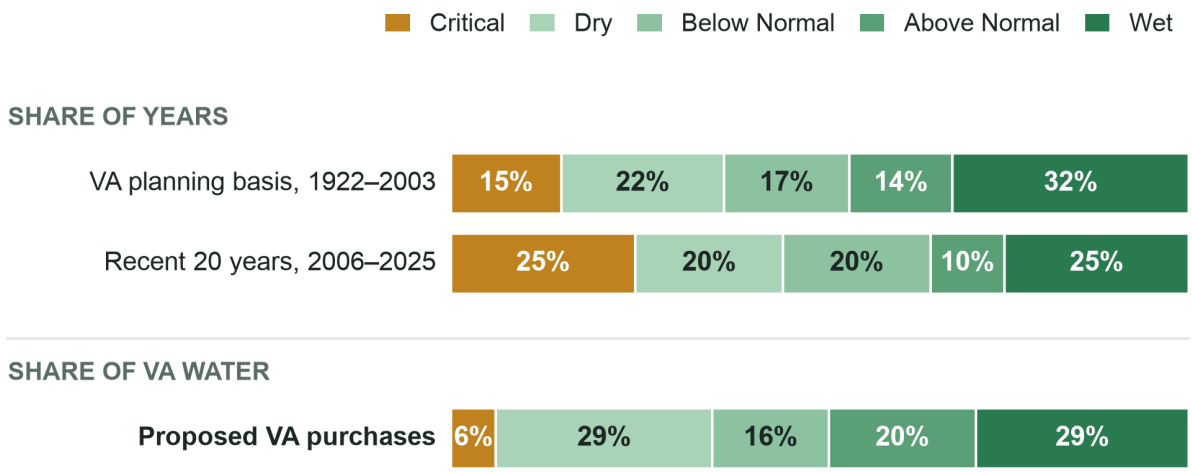


Figure 7. Share of years of each type, on the VA planning basis and in 2006–2025, against the share of VA water bought in each type, each type's purchases weighted by its AF and share of years. Share of years: Sacramento Valley water year index (DWR, CDEC WSIHIST); HRL Global Agreement App. 1 Table 1b, which matches CalSim II's 1922–2003 record. VA water: Final Draft Bay-Delta Plan, Aug 2026, § 4.4.9.3 p. 75.

Purchases in wetter years also far exceed what the market has ever moved. The Plan buys 147,000 AF from sellers in an Above Normal year and 123,000 AF in a Wet year, 5 and 50 times the north-of-Delta transfers in a typical year of each type. In 2026, an Above Normal year, the State Water Board approved about 27,000 AF of north-of-Delta transfers. In 2023, the last Wet year, it approved about 2,300.

On the same 8-year basis as Section 1, water bought in Above Normal and Wet years would cost about $850m: $121m of market and fixed-price purchases and $728m of permanent purchases at Fair Ranch's price, 50% of the $1.69B total.

Market volumes: DWR Water Transfer Information Management System; Yuba Accord Draft SEIR (2024) Table 5-1; State Water Board orders (2023 and 2026 volumes are Board approvals, which are maximums). VA volumes: Final Draft Bay-Delta Plan p. 75 and App. B.1 Table B.1-6. Cost: Prairie Creek Labs VA purchase cost model.

Appendix A. RD 108's Tract 6

Reclamation District 108 (RD 108) is a party to the Fair Ranch agreement and is buying the ranch. It also owns farmland of its own, Tract 6, which it leases to farmers: about 7,000 irrigated acres (6,947), 98% of them rice, directly west of and adjoining the ranch between the Colusa Basin Drain and the Sacramento River (Figure A1). Its water comes from RD 108's own Settlement Contract, not the ranch's.

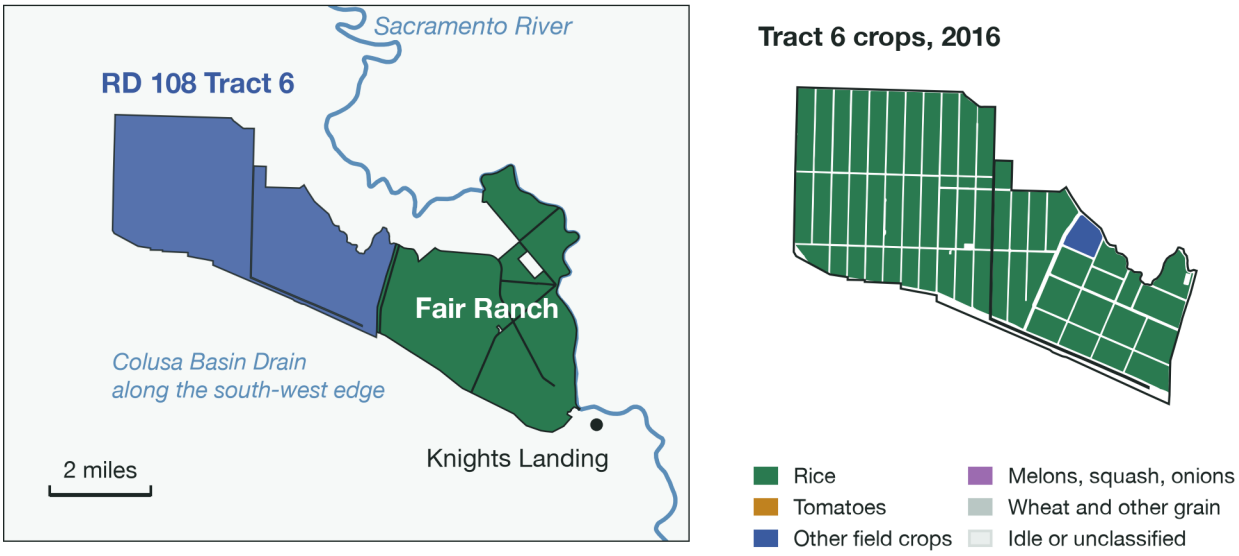


Figure A1. RD 108's Tract 6 beside Fair Ranch (left), and Tract 6's crops in 2016 (right). Tract 6 is shown as the 22 tax-exempt Yolo County parcels west of and adjoining the ranch; the county parcel layer has no owner field, so RD 108 ownership is inferred. Sources: MBK Engineers map; Yolo County parcels; USGS National Hydrography Dataset; DWR/Land IQ Statewide Crop Mapping 2016.

Why it is there. The grantee's proposal (Grant Agreement 4600016769, Exhibit G) names Tract 6 as the fallback for groundwater substitution, which the contract bars in 2026–28 and caps afterward: "In the event of circumstances that may prevent the use of groundwater substitution historically relied upon in part to make water available for transfer from the Fair Ranch, RD 108 would jointly manage Fair Ranch with lands it owns within RD 108, known as Tract 6." The contract turned that into a duty to coordinate:

> **FA § 6.b.iv:** *"Upon the RD 108 Acquisition …, as necessary to ensure the annual production of the Minimum and Expected Volumes, RD 108 will jointly and in good faith coordinate management of the Property and RD 108's separate Tract 6 property, including any applicable rights under the RD 108 Settlement Contract, … with all related water producing actions specified in the annual Water Use Forbearance Plan, without interfering with the current viability of RD 108's interest in Tract 6."*

What it would take. Closing the gap to 16,000 AF would mean idling 1,486 to 5,779 of Tract 6's ~7,000 irrigated acres, depending on the year:

Year type	Fair Ranch delivers, AF	Gap to the 16,000 AF target, AF	Tract 6 acres to idle to close the gap
Wet	11,690	4,310	1,486
Above Normal, Below Normal, Dry	10,746	5,254	2,218
Shasta Critical	8,767	7,233	2,686
Drought Protection Program	5,968	10,032	5,779
2022-type (18% supply)	**2,104**	**13,896**	**not reachable**

In a 2022-type year Tract 6 would have to idle 6,256 of its 6,947 acres just to lift Fair Ranch to the 5,000 AF floor, and 16,000 AF is out of reach: all of Tract 6 alone yields 4,639 AF in a 2022-type year.

Why it is not in our totals. Nothing obliges anyone to produce Tract 6 water. § 6.b.iv sets no volume and no acreage, and it carves out Tract 6's "current viability". Compliance is measured only by Exhibit D-2 (§ 6.b.v.2), which accounts for water "from the Fair Ranch Property" and never mentions Tract 6. And the remedies attach only to the 5,000 AF Minimum Volume (§ 13.c.i). Whether Tract 6 water counts would be settled, if at all, in each year's forbearance plan.

Tract 6 counted the way Exhibit D-2 counts Fair Ranch: crop-mix baseline, every eligible acre available, RD 108's own Settlement Contract supply, the Drought Protection Program, and Tract 6's share of RD 108's HRL commitment (1,749 HRL AF, 1,179 AF of credit). Sources: Grant Agreement 4600016769, Exhibit D (Instream Flow and Forbearance Agreement) §§ 6.b.iv, 6.b.v.2, 13.c.i and Exhibit D-2; Exhibit G (grantee's proposal); Prairie Creek Labs Tract 6 model.