State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES

Land*Flex* Grant Program Final Report

Outcomes, Impact, and Future Considerations

June 2025

Contents

Acronyms and Abbreviations

AF	acre-feet; acre-foot
AGI	Adjusted Gross Income
COD	critically overdrafted (basin)
Drought Relief	Domestic Well Drought Relief
DWR	California Department of Water Resources
ET	evapotranspiration
GSA	groundwater sustainability agency
GSP	groundwater sustainability plan
LandFlex	LandFlex Grant Program
SGMA	Sustainable Groundwater Management Act
SYA	Sustainable Yield Acceleration
TAP	Technical Assistance Provider
WY	water year

1. LandFlex Grant Program Summary and Outcomes

The LandFlex Grant Program (LandFlex) was developed by the California Department of Water Resources (DWR) in response to the severe drought conditions of 2022. California was grappling with its third consecutive year of drought that caused hundreds of domestic wells in the Central Valley to run dry or nearly dry, leaving communities urgently seeking solutions. DWR received $25 million in funding from the California Legislature, designated as "Agricultural Drought Relief," during a period when drinking water scarcity became a critical issue. During emergencies, temporary measures, such as bottled water or storage tanks, are critical for ensuring immediate access to water and relieving pressure on affected communities. DWR's focus with LandFlex, however, was on investing in sustainable, long-term solutions that help prevent such emergencies from occurring in the future. DWR's aim was to develop a strategic, enduring program that would support vulnerable communities both now and into the future, thereby supporting California's resilience to climate change. To achieve this goal, DWR partnered with California Alliance with Family Farms, Self-Help Enterprises, Western United Dairies, and the Almond Alliance (collectively referred to as Technical Assistance Providers or TAPs), and coordinated with the California Department of Food and Agriculture, to develop an incentive program designed to address three water management challenges: human right to water, sustainable water management, and agricultural water management.

LandFlex was launched as a pilot study and served as a new and innovative tool to protect vulnerable drinking water wells. The success of this program was made possible through the trust and collaborative partnership among the State agencies, TAPs, groundwater sustainability agencies (GSAs), and growers involved. This partnership allowed the State to:

- Provide immediate relief to Central Valley communities that rely on groundwater for their drinking water needs by offering incentives to nearby growers to temporarily fallow their enrolled land for one year, helping to replenish severely depleted wells. As a condition of participation, growers implemented cover crops or equivalent land management practices on fallowed acreage, mitigating dust impacts and protecting public health during extreme drought conditions.
- Establish incentive-based agreements with growers to permanently

relinquish their right to overdraft groundwater on enrolled lands, effective immediately. This approach advances sustainable groundwater management and promotes early compliance with California's Sustainable Groundwater Management Act (SGMA), well ahead of the 2040 deadline for critically overdrafted basins — representing a first-of-its-kind strategy.

- Protect critical infrastructure from the impacts of land subsidence.
- Support the long-term productivity of working lands by incentivizing growers to adopt more sustainable farming practices, promoting agricultural viability, enhancing ecological health, and delivering broader benefits to surrounding communities.

The program's Draft guidelines were made publicly available in December 2022, making $23.3 of the $25 million in grant funds available to GSAs and growers. DWR received applications in January 2023 and made final awards at the end of February 2023. Three key eligibility requirements were necessary for a GSA to participate in the program: a GSA must (1) be located in a critically overdrafted basin (COD); (2) have adopted and are actively implementing the basin's allocation plan that identifies a quantified volume of overdraft as of Water Year (WY) 2022; and (3) have a measurable groundwater accounting method (i.e., evapotranspiration or well metering) for WY 2022 and WY 2023.

Initially, seven GSAs applied for LandFlex and, based on criteria outlined in the LandFlex Program's Guidelines, the top three highest-ranking GSAs were selected for award. These three GSAs were:

- Madera County GSA – $9.3 million.
- Greater Kaweah GSA – $7.0 million.
- Eastern Tule GSA – $7.0 million.

Although LandFlex was launched as a drought program in late 2022, following three consecutive years of drought, California was quickly confronted with unprecedented heavy rainfall at the onset of 2023. This unexpected event caused severe flooding across Northern California, the

Central Coast, and the Central Valley. As many Central Valley communities were being inundated or threatened with flooding, LandFlex was able to quickly adapt to accommodate actions (as outlined in Governor Newsom's 2023 Executive Order N-16-25, expediting flood diversion and recharge) that supported local flood response, as it maintained its function as a drought relief program. With growers temporarily fallowing their fields, the program seized the opportunity to use those open fields to capture floodwaters to help alleviate high surface-water flows and facilitate groundwater recharge throughout the region, while furthering the program's goals of water conservation and community resilience.

As 2023 progressed into its second quarter, various challenges hindered each Phase 1 GSA's ability to enroll growers into the program, preventing them from fully utilizing their awards. In response, DWR conducted a thorough analysis, including a lesson's learned workshop with the GSAs, to identify issues hindering their ability to implement funding, see Section 3, "General Feedback from GSAs and Growers on LandFlex." Because of these and other factors specific to each GSA, with their consent the GSAs returned unused funding to DWR. DWR then established a strategic path forward and reallocated unutilized award funds into Phase 2 of LandFlex. Those resources were effectively redirected to the other GSAs that applied for, but did not receive, initial Phase 1 funding: Lower Tule Irrigation District, Pixley Irrigation District, Mid-Kaweah and Westlands Water District. With the unprecedented rainfall continuing to affect California, Phase 2 placed an added emphasis on a grower's ability and willingness to recharge. Approximately $17 million was available in Phase 2 to eligible growers across the four GSAs. The award process in Phase 2 differed slightly from Phase 1. For the second round of funding, GSAs evaluated their growers first, based on DWR's minimum scoring criteria as outlined in the LandFlex Program's Guidelines, along with any GSA-specific criteria, if applicable. Then, final award decisions were made by DWR, with input from the Technical Assistance Providers (TAPs), based on the available funding.

Phase 2 GSAs selected for awards were:

- Lower-Tule Irrigation District GSA – $7.8 million, later increased to $8.9 million.
- Pixley Irrigation District GSA – $5 million, later reduced to $3.2 million.
- Westlands Water District GSA – $4 million, later increased to $5.4 million.

Phase 1 GSAs final award totals after reimbursement of unused funds:

- County of Madera GSA – $9.3 million, reduced to approximately $680,000.
- Greater Kaweah GSA – $7.0 million, reduced to $2.9 million.
- Eastern Tule GSA – $7.0 million, reduced to $2.2 million.

DWR received more grower applications during Phase 2 than during Phase 1. This difference was driven by several factors, the largest being that GSAs were offering their own incentives to growers who recharged their lands to help replenish the groundwater basin, in addition to LandFlex incentive payments. Although recharge was a voluntary option within the LandFlex program, this collective action between GSA basin-specific initiatives and a State program, the program was viewed by growers as a unique tool that could help them continue working their lands, while also supporting SGMA compliance.

During the development of LandFlex, the program's anticipated outcomes were approximated to:

- Enroll approximately 10,000 acres.
- Provide a long-term benefit of preventing the extraction of an estimated 100,000 to 200,000 acre-feet (AF) of groundwater.

As LandFlex wrapped up its year-long implementation of Phases 1 and 2, the program has achieved the following results* to date:

- Grant funding to growers currently expended is approximately $22.4 of the $23.3 million available.
- Enrolled lands totaled 4,474 acres.

- Total water saved amounted to 103,643 AF.
    - Immediate protection of 16,512 domestic wells.
    - Evapotranspiration (ET) savings of 14,178 AF.
    - Permanently retired groundwater overdraft of 66,993 AF.
    - Water recharged totaled 22,471 AF (it is unknown at this time if Phase 2A will add to this result).
- State investment (cost of water for early SGMA compliance for COD basins) is approximately $216 per AF. When the full $23.3 million is expended, the total State investment will be $225 per AF.

*Note: *The results are estimated final totals with the inclusion of Phase 2A, see below.*

The domestic wells protection estimate was based on analysis using the SGMA Data Viewer's dry well reporting tool and the proximity of these wells and community water systems to LandFlex enrolled lands. Although this estimate reflects likely reductions in groundwater drawdown caused by reduced groundwater pumping, GSAs can further validate and refine this number through continued groundwater level monitoring and well impact reporting. As required by LandFlex grant agreements, grantees must conduct at least three years of post-grant monitoring to assess program benefits, including groundwater savings, land use shifts, and crop decisions following fallowing. In addition, targeted analyses will evaluate drinking water benefits for vulnerable communities near enrolled areas. Beyond the initial three-year required reporting period, GSAs may continue tracking and reporting these outcomes in their annual GSP reports submitted to DWR.

Despite enrolling only half the anticipated acreage, LandFlex has still achieved its long-term goal of saving just over approximately 100,000 AF of groundwater, thereby reducing the State's per AF cost of water to $216. Although the original pilot concept anticipated needing a larger acreage to meet program objectives, effective local coordination — led by the Department in collaboration with the TAPs and in partnership with the GSAs — enabled a more strategic approach. By prioritizing enrollment of high water-use acreage and capitalizing on the extreme weather conditions California was experiencing, the program achieved greater groundwater savings and more focused impacts with significantly fewer acres than initially expected. The program has proven effective and adaptable in addressing the

challenges of climate change, while delivering significant results with lasting benefits at a fraction of the cost, making it a worthy State investment.

As Phases 1 and 2 concluded their year-long LandFlex implementation and the GSAs reported their findings, approximately $1.4 million in grant funds remained in the fourth quarter of 2024. During Phase 2, Westlands Water District GSA expressed interest in additional funding, as they had an active and long list of interested growers. This GSA was selected to receive additional funding to help achieve a secondary objective of LandFlex — protection of critical infrastructure from the impacts of land subsidence. This additional funding allocation marked the beginning of Phase 2A, which is underway and will conclude its year-long implementation at the end of 2025. Effectively, lands enrolled in Phase 2A will cease contributing to groundwater overdraft in areas with land subsidence in proximity to the California Aqueduct.

2. Local SGMA Landscape

Although California has a documented history of extreme weather events, the development of LandFlex unfolded during a period marked by a notable increase in the scale, frequency, and intensity of such events. The rapid shift from extreme drought conditions to widespread inundation posed a significant test of the program's adaptability.

Because of extreme weather variability and varying GSA readiness to access full funding that allowed for multiple phases, this created a unique set of conditions that ultimately highlighted the program's inherent adaptability and potential as a climate-resilient solution, as outlined below.

Phase 1 (Drought/Dry Wells). LandFlex was developed in response to California entering its third consecutive year of severe drought, which resulted in widespread impacts across the Central Valley, including the drying of numerous domestic and community drinking water wells. The program was designed to address these urgent water supply challenges and enhance drought resilience in vulnerable groundwater-dependent regions.

Phase 2 (Flood/Recharge). In late 2022 and early 2023, California experienced a series of intense storms and consecutive atmospheric river events that led to widespread flooding across the Central Valley. In response, the LandFlex program strategically utilized fallowed agricultural lands to capture excess floodwaters for groundwater recharge. In several instances, these efforts also contributed to reducing downstream flood risks and protecting vulnerable communities.

Phase 2A (Protection of Critical Infrastructure). Land subsidence remains a significant concern in California's Central Valley, particularly in areas adjacent to the California Aqueduct, where it threatens the integrity of vital water conveyance infrastructure. LandFlex played a key role in identifying vulnerable lands near the aqueduct and contributed to the mitigation of subsidence by curtailing groundwater overdraft in these high-risk zones.

DWR was able to maximize water savings during each climate emergency, thanks to the effective use of the three incentive components of LandFlex described below.

Domestic Well Drought Relief. To achieve immediate relief of drought-related pressure on shallow domestic wells, LandFlex provided up to (with a cap of) $350 for each AF of water kept in the groundwater basin for a period of 12 months. GSAs determined a locally appropriate payment amount per AF. Each AF of saved groundwater must be verified by the GSA using locally adopted and State-approved methods of ET or groundwater-well-metering measurement and reporting.

Thereafter, a grower was required to utilize surface water ONLY, outside of the sustainable limit of groundwater pumping on the enrolled LandFlex acreage.

Sustainable Yield Acceleration (Long-Term Elimination of Groundwater Overdraft). LandFlex provided a one-time payment of $1,000 for each AF of permanent overdraft eliminated, based on a GSA's WY 2023 overdraft allocation plan. For example, a grower whose GSA has established a 2.2 AF per acre (per year) overdraft allocation would receive $2,200 ($1,000 x 2.2) as a total one-time payment for each enrolled acre. The GSA ensured that all overdraft allocations associated with each enrolled acre during and after WY 2023 would be permanently eliminated and accounted for in GSP updates and consistent with LandFlex program requirements. The GSA-determined sustainable yield allocation remained unaffected.

Transition to Sustainability. To facilitate beneficial agricultural land practices associated with immediate and long-term elimination of overdraft pumping, LandFlex provided a one-time land-use transition payment that varies based on the current uses of enrolled acres, such as row crops, dairy feedstock, and permanent tree crops. Removal and on-farm mulching of orchards, purchase of upcycled agricultural waste for dairy feed replacement, and cover cropping for air quality and pollinator habitat are examples of actions eligible for the Transition to Sustainability payment component.

Payments are based on University of California Cooperative Extension economic data and other public agency sources:

- Row crops: $250 per acre.
- Dairy feed replacement: $2,000 per acre.
- Permanent orchard and vine removal: $2,800 per acre.

Each incentive component was essential to properly incentivize optimal grower participation based on each GSA's specific landscape and needs. For instance, during Phase 1, GSAs implemented higher Domestic Well Drought Relief (Drought Relief) payments to incentivize fields and curbing groundwater pumping. In contrast, during Phase 2, GSAs determined that minimal-to-no payments would be required for the Drought Relief component, given the limited ET savings. This shift in approach allowed for the strategic use of floodwater recharge on agricultural lands. The flexibility inherent in the program enabled a significantly greater volume of water to be recharged into the aquifer. The effective calibration of the Drought Relief component was not solely predicated on the volume of water conserved, but also on the growers' willingness and capacity to postpone planting to prioritize groundwater recharge. Additionally, the active collaboration and proactive facilitation of recharge efforts by the GSAs, particularly during the influx of floodwaters, played a pivotal role in the program's overall success.

3. General Feedback from GSAs and Growers on LandFlex

The overall feedback from GSAs indicates that LandFlex has been highly effective in motivating growers to support SGMA compliance. However, some key concerns identified by GSAs and growers include the following (with recommendations):

- **Program Timing.** The timing of the LandFlex rollout was not aligned with the planting season. Several factors prevented DWR from coordinating this critical timing, which ultimately led to some growers being unable to apply. The uncertainty of potentially being enrolled in LandFlex, coupled with the fact that many growers had already purchased seeds and prepared land, made it economically infeasible for them to participate.

  Recommendation**.** Open the application process two to three months prior to the main two planting seasons, spring and fall. Spring planting season is typically from January through March and fall planting season is typically from August through November. This extended application process will allow growers the opportunity to apply for the program and adjust for current hydrology needs and, pending final awards, determine which business decision best suits their needs.

- **Adjusted Gross Income (AGI) Limit.** The program's AGI limit was set at a three-year average of less than $2.5 million. Although used as an inclusion factor to support small and mid-sized farms, this threshold was seen as too low by many, particularly for larger growers located adjacent to vulnerable communities. These growers were excluded from the program because of the income limitation, potentially limiting the program's overall impact.

  Recommendation**.** If LandFlex were to receive additional program funding exceeding $25 million, it may be beneficial to consider raising the AGI limit threshold (currently set at $2.5 million or less), pending program priorities. Also, retaining the payment cap of $2.5 million would continue to ensure broad grower participation while upholding the integrity and intent of the program. However, final decisions should be based on the availability of program funds and priorities.

- **Variability in Sustainable Yield Acceleration (SYA) Incentive.** Half of the GSAs that participated felt that the SYA payment was fair, having been allowed to provide their growers what was included in their GSP allocation, generally higher overdraft allocations (e.g., approximately 2 AF per acre). The other participating GSA's felt that the SYA payment was not equitable (for those having lower overdraft allocations) producing a lower incentive payment for participating growers.

  Recommendation**.** Consideration for implementing an "equalizing cap" as a future solution. Rather than penalizing GSAs that are progressing towards sustainability at a faster rate than others, a cap could be introduced to balance the incentives. This cap, which could range from 0.5 AF to 1.0 AF per acre, would apply to any participating GSA. Establishing an SYA cap would safeguard against the disadvantage of those GSAs making faster progress, while still upholding the overarching sustainability objectives of the program. Additionally, implementing an equalizing cap would enable the program to expand its scope to include basins outside of COD areas, supporting future subsidence prevention efforts.

- **LandFlex Payment Components.** There were concerns early in the program that the payment components were too complex for both GSAs and growers to fully understand. These concerns were further compounded by the accelerated timeline required to launch the program in response to the urgent impacts of the drought during that period. The confusion stemmed primarily from the perception that the three payment components were optional or a la carte, rather than understanding them as mandatory elements of the program.

  Recommendation**.** Enhance and expand communication efforts to ensure clearer understanding of program requirements among interested parties. Leveraging the program's TAPs proved effective in mitigating confusion, as they served as intermediaries between growers, GSAs, and DWR.

- **Sustainable Yield Acceleration Component.** Many growers were very hesitant to give up their ability to overdraft permanently. For growers in undistricted lands who rely solely on groundwater with no access to surface water, this was a troubling prospect, as it was for many growers who do have access to surface water. Additionally, the

prospect of changing farming practices before they were ready further contributed to hesitation. As a result, fewer growers ultimately enrolled in LandFlex.

Recommendation**.** Timing is a key factor for growers. With GSAs focusing on meeting SGMA milestones, LandFlex serves as a valuable tool to help growers achieve those goals, allowing them to take proactive steps now that will eventually be required.

- **Limitations for Small Farmers.** Non-profit organizations serving smaller farmers, even the program's TAP (California Alliance with Family Farms, which helped develop the program), noted that small growers may not be ideal candidates for the program, despite the inclusion initiatives outlined in the LandFlex Program's Guidelines. Small farms often lack the financial resources to temporarily forego their land's full productivity, much less do so on a permanent basis. However, all the lands enrolled in County of Madera GSA were all small farms and showcased how the program worked successfully for them

  Recommendation**.** No recommendation. The approach taken was inclusive enough to accommodate both small and mid-sized farms, as designed. Ultimately, the lesson learned was that LandFlex is not a program that can suit everyone. Ultimately, it depends on each grower's individual business model and what works best for their unique circumstances.

4. LandFlex 2.0 Considerations

LandFlex Climate Resiliency Option

As California faces increasing impacts from climate change and the need to advance groundwater sustainability, feedback has highlighted that LandFlex is an effective climate adaptation tool. Looking ahead, the future of the LandFlex program should consider adjustments to become more flexible. These adjustments and other considerations will enhance the program's ability to adapt to the impacts of climate variability, ensuring continued resilience in water management and safeguarding vulnerable communities and infrastructure. These adjustments and other considerations include:

- **GSA Flexible Demand Management Strategies.** Allow GSAs the opportunity to propose flexible demand management strategies, considered the most effective, locally tailored approaches for achieving compliance with SGMA requirements. This would include placing a priority on any of the three LandFlex objectives based on makeup of a GSA: (1) protection of dry wells and community water system(s), (2) groundwater recharge on strategic lands, and (3) protection of critical infrastructure preventing land subsidence. Because the SGMA implementation framework is evolving and numerous tools are available to GSAs for improved water management, this change would allow a GSA to prioritize additional initiatives, such as riparian and ecosystem management or atypical fallowing projects. Additionally, a GSA could propose the implementation of specific technologies, like purple pipe or subsurface drip irrigation. This adjustment enables policy prioritization across various climate-related categories, while allowing each GSA to tailor the program to meet its unique geographic needs when working with growers.
- **Inclusion of High and Medium Priority Basins.** This consideration, requested by numerous GSAs, NGOs, and legislators throughout the implementation process, would expand LandFlex opportunities into all basins subject to SGMA implementation. This expansion to all basins would offer GSAs an opportunity to advance land use changes to support groundwater sustainability and to mitigate land subsidence near critical infrastructure areas. The primary challenges associated with this change revolve around the requirement that basins have a groundwater allocation program. Many basins are in the process of developing allocation programs, and some do not require a groundwater

allocation program. Where the latter is true, basins without an allocation program could benefit from a LandFlex program to advance their groundwater sustainability.

- **Recharge Flexibility.** Many of the adjustments made by DWR in response to the unprecedented rainfall in California in early 2023 provided LandFlex with significant local flexibility to incentivize recharge. To ensure readiness for all opportunities to facilitate recharge, the conditions outlined in the Governor's 2023 Executive Order N-4-23, were codified in the Water Code (WC1242.1) via the July 2023 enactment of Senate Bill 122.
- **Rolling Contract Option.** When DWR initially developed LandFlex, this option was included in the grower requirements. Although not used, DWR preserved this option to apply at its discretion on enrolled LandFlex lands intended for direct recharge. Continuing this option would be highly advantageous, provided that priority is given to GSAs that manage strategically significant aquifer recharge locations, in alignment with State priorities. This option would ensure that resources are directed toward the most critical areas for effective groundwater replenishment, optimizing the long-term sustainability of the aquifer system.
- **Incentive Payment Structure.** A lesson learned early in LandFlex was that not every grower has the financial ability to enroll in LandFlex:
    - As noted in Section 2, if DWR imposes a limit (i.e., equalizing cap) on the SYA incentive payment, particularly in inadequate basins to ensure equity, it should not reduce the incentive for growers to make these long-term, sustainable changes to their crops (i.e., switching from high-water-use crops to more water-efficient crops). Ensuring this balance will be key for program success.
    - As part of the lessons learned, growers stated that removing orchards costs nearly double what the Transition to Sustainability incentive provided ($2,500 per acre for orchards), based on current market conditions. Growers noted this was mitigated by the SYA incentive.
    - The Transition to Sustainability incentive, particularly the $2,000 per acre for dairy feed replacement along with the flexibility of

cover crops, proved to be a good balance for dairy farmers enrolling — and most could transition out their triple crops for this incentive plus the SYA incentive.

    - Additional solutions for how to balance the incentives for growers, particularly for those with permanent crops and a need to remove orchards, will be necessary if the SYA incentive has an equalizing cap.

- **Support Through Local Resources.** Local agencies could establish a comprehensive framework for leveraging their own financial resources to independently operate and manage dry well protection, groundwater recharge, and subsidence programs. This approach would grant GSAs greater autonomy, enabling them to tailor initiatives to address the specific needs of their respective regions. If State funding is inadequate to fully support the costs of these programs, GSAs would have the option to utilize alternative funding mechanisms, such as Proposition 218 assessments. By enabling GSAs to secure local revenue streams, this strategy would mitigate funding shortfalls and ensure that these sustainability efforts are not hindered by fluctuations in State funding availability.

5. Conclusion

The LandFlex program has proven to be a critical and effective tool in enhancing climate resilience. As California faces significant groundwater overdraft and declining water levels, LandFlex plays a key role in safeguarding the availability of safe drinking water, reducing agricultural water use near underrepresented communities, and promoting agricultural sustainability while complying with SGMA requirements. Additionally, the program creates opportunities for strategic groundwater recharge and protects vital water conveyance infrastructure from land subsidence. As SGMA is implemented, local agencies are empowered to address these pressing challenges that threaten the long-term viability of agriculture and communities. LandFlex can contribute significantly by offering a flexible framework that promotes sustainable water management practices and enhances coordination with other agencies involved in SGMA and land management.

The challenges faced by California's vulnerable communities persist, especially as extreme weather events continue. Building on the program's successes provides a foundation for the development of a future program, potentially supported through Proposition 4 (bonds for safe drinking water, wildfire prevention, and protecting communities and natural lands from climate risks). A comprehensive review of the program, along with consideration of future needs, will be essential in revising grant guidance for the future of the LandFlex program.

Looking ahead, LandFlex can continue to serve as a critical tool for addressing California's evolving water challenges, regardless of climate fluctuations. Through tailored local strategies, the program can align with the unique needs of different basins and GSAs, enabling DWR to target the most vulnerable regions. This endeavor will ensure that efforts to combat drought, flood, and land subsidence are both effective and equitable. In this way, LandFlex will remain a central component of California's water management strategy and balance environmental, economic, and social needs for long-term sustainability.


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