



Home on the range: why ruminants and native grasses might be key to California's future

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“Food grows where water flows” is a slogan you come across frequently in California’s Central Valley. There are few regions in the world where as much food can be grown as here. Out of the 10 US counties with the highest agricultural production (according to value), nine are in California. The top three, Fresno, Kern and Tulare County are in the San Joaquin Valley, the southern part of the Central Valley.



Canals supply water for agriculture and cities like LA



Northern California delivers water south



The San Luis Reservoir holds water pumped up from the Delta

All is well in the agriculture world between Stockton and Bakersfield as long as water flows. The problem is that it doesn't flow anymore, at least not in the huge quantities needed.

The San Joaquin Valley has always been hot and dry, and the climate crisis has intensified periodic periods of drought. Until recently, the complicated system of water transfers and ever more water extraction from the aquifer through deeper wells have provided the growers and farmers who could afford it with the water they needed. But that is about to change.



To drill wells that go down 3000ft and more oil drilling equipment is needed

In 2014, the Sustainable Groundwater Management Act, SGMA, was passed to stop the massive overdraft of groundwater in particular in the San Joaquin Valley. By 2040, no more water should be extracted from the groundwater basin than can be replenished through surface water. As a result, there will be far less water available for thirsty crops. "By 2040, average annual water supplies could decline by 20 percent, constrained chiefly by the transition to groundwater sustainability under the Sustainable Groundwater Management Act, but exacerbated by climate change and increased environmental regulations"¹, says the

Public Policy Institute of California, PPIC.

"In the worst-case scenario, nearly 900,000 acres of farmland would be fallowed, almost 50,000 jobs would be lost, and regional economic activity would decline by 2.3 percent". "SGMA is going to be the biggest change in terms of water availability over the next decade"², concluded UC Davis Acting Professor of Law, Karrigan Börk on the California WaterBlog.

Fallowing 900,000 acres would mean a loss of at least 20% of agricultural land in the San Joaquin Valley. Some estimates are even higher.

In any case, one of the big questions is what to do with the fallowed land? Does it still have productive value and, most importantly, how can soil erosion and, in such dry conditions, dust storms be prevented?



Nothing grows without irrigation

Where California goes, there goes Europe ...

Why is a London, UK, based journalist travelling to California to look into these questions? For one: because of the climate crisis we are seeing more extreme weather events the world over. A Swiss study published in January 2025 in the journal *Science* found that over the last 40 years, worldwide, the size of areas hit by 'mega droughts' (defined as lasting for more than one regular dry season) increased by 50,000 km². Such drought events led to yield loss, increased fire risks, drinking water shortages and thus caused enormous economic damage.

Farmers and growers are affected by extreme and prolonged droughts, as well as by floods. In October of 2024, the European Environment Agency (EEA) concluded that in 2023 66,500km² (25,675 square miles) of cropland in the EU had suffered yield losses due to drought³.



Whole towns have to rely on deliveries from water tankers

Spain, the country that produces roughly a quarter of the EU's vegetables and fruit, had the largest territory under drought.

In addition, the EEA acknowledges the importance of grasses: "Grasslands and heathlands are among the most biodiverse areas in the EU, storing a large amount of carbon in the below ground biomass pool".

Here's why we need to look at grasslands

Over millions of years grasslands co-evolved with ruminants. Which means: if we want to restore and maintain biodiverse permanent grasslands they need to be grazed. "Sustainable grazing by cattle and other ruminants stimulates root growth and thereby humus building and carbon storage in the soil. In humus, more than half the content is carbon – the C from the CO₂ in the atmosphere. Each additional ton of humus in the soil absorbs about 1.8 tons of CO₂ from the atmosphere. Contrary to common assumption, cattle can help to limit climate change. If we let them....⁴", writes the veterinarian Anita Idel, who, like Allan Savory, has been advocating for well managed grazing as one of the best environmental management tools we have.

What's that got to do with the San Joaquin Valley? Historically, vast areas of grassland could be found everywhere in California. "Early reports from explorers indicate that vast herds of grazing animals in the Central Valley rivaled the numbers of bison on the Great Plains"⁵, states a University of California Agriculture and Natural resources report. Agriculture and urban development have brought in dramatic changes – today, those early explorers would not recognize the Central Valley anymore. Over the last two centuries "European settlement has eradicated over

96 percent of the entire Central Valley's original four million wetland acres and 95 percent of its native perennial bunch grasses"⁶, writes Aaron Gilbreath.

The grasslands in the San Joaquin Valley may have been grazed not by bison but by animals such as Thule elk, wetlands and vernal pools have mostly gone. But if 20% to 30% of the agricultural land eventually has to be fallowed, could native grasses be re-established? Could such grasslands be maintained through managed grazing? And could ranchland provide some income for farmers and growers? Per acre, the money to be made from cattle and sheep would never make nowhere near as much as what can be made from almond orchards, but certainly more than leaving the land fallow and unproductive.

And what are the other options? Selling the land for urban development? If, as the PPIC estimates, 50,000 jobs might be lost, land developers may not be very keen to build. Might fields of solar panels replace the almond orchards? In particular on the west side of the San Joaquin Valley a lot of 'solar farms' have already been established – most on bare ground. Is 'land management' a possible additional income stream for ranchers? Can solar farms and grassland be combined? What about fire prevention services?

These were some of the ideas and questions that had me come to the San Joaquin Valley and to the Coastal Range to visit with farmers, ranchers and experts.

The climate crisis is already taking its toll. Part 1 will describe how almond growers in the San Joaquin Valley are dealing with increasing heat and less water. Part 2 looks at what's happening on the east side of the valley, where a rancher is increasing soil fertility through managed grazing and researchers explore how to re-establish native grasses. Sheep and cattle working as efficient land managers – part 3 - looks at the services ruminants can provide to solar farms, house owners and golf courses. Raising cattle on grass takes longer than 'finishing' animals in a feedlot with grain. Ranchers therefore either need to get a much better price for meat from grass-fed animals, or they need to be remunerated for 'ecosystem services'. Part 4 meets the ranchers who have found ways to make it work by changing the food system and the people who help them along the way.

Part 1: More heat, less water – the new reality of almond growing in the San Joaquin Valley



The 5th generation: Christina Bylsma and Benina Montes

“Have you been to Burroughs Farm?”, was usually the first question in any conversation in California about almonds, water and the climate crisis. The 1,000 acre farm east of Turlock is not only one of the few organic almond farms in the San Joaquin Valley, it is ROC – regenerative organic – certified. “Twenty years ago, we were farming for maximum production. The floor under the trees was bare. But we felt it was the wrong system”, says Benina Montes, managing partner and 5th generation on the farm. Transition to organic began in 2006 and by 2015 the farm was fully certified organic. The family agreed, it still wasn’t enough. “Organic is now all about what you don’t do. Regenerative is what you do to look after the soil”. In the orchards, cover crops are well established now. While on most farms in the area the SOM (soil organic matter) ranges between 1.5% - 2%, it’s between 4.5% - 6% at Burroughs.



Walnut trees have been added for more diversity



Excellent soil health has halved the irrigation water need

Carbon rich soils absorb and retain more water. While neighboring farms use about 48 inches of irrigation water, trees on Burroughs Farm need only about 24.5 inches. Montes doubts that it will be possible to reduce the water need of the trees much further. “You just can’t grow almonds without irrigation”, she says. The farm still grows mostly almonds, but walnuts have been added to the mix because they are more frost tolerant and to increase diversity. “To have efficiency of scale and diversity – that is the conundrum”, says Montes. Trees that don’t do well are taken out. Since 2021, the cover crops are grazed by a herd of 750 ewes, which stay on the farm from January to April when grasses and cover crops are lush. They also graze unproductive areas and margins but for food safety reasons the animals have to be out of the orchard 90 to 120 days before harvest. The farm team works with a number of experts and has plenty of ideas how to build resilience, but much comes down to the question of money and time: costs for seeds, increasing labor and electricity costs. More research would be needed, but with the low price of almonds such research simply is not feasible.

It's all a numbers game



Almonds stored before processing

Agriculture in the San Joaquin Valley comes down to the market, says Prosperi when we meet. “It is possible to grow over 200 crops in the valley but very few will make you any money”. What counts is value per acre - cotton, dairy, grapes... all are low value per acre compared to nuts. Almonds, pistachios and, to a degree, walnuts, are the only money making crops. Almonds top the list because the climate in the valley is uniquely suited for growing them while walnuts can be successfully grown in many parts of the world. Farmers have successively given up cotton, wheat, citrus, dairy, olives, raisins, in favor of nuts. Prosperi says when he went into almonds in 1987 there were around 250,000 acres of almonds in the whole Central Valley. Now there are between 1.3 and 1.4 million acres.



Most orchards still have bare ground

Until 2022 the almond acreage grew by about 100,000 a year. “We now have reached an equilibrium”, says Prosperi, “as many trees are newly planted as are ripped out”. A number of factors decide whether almond acres are added or taken out of production. According to Prosperi’s calculation, one to two million acres of agricultural land will eventually be fallowed, not just because of SGMA and a lack of water but also because of rising costs. “The total growing area in the San Joaquin Valley will shrink by at least 25% to 30%”. The water available will be very expensive. Energy costs are rising. “We pay 64¢ for what costs 8¢ in Idaho”. Labor costs are going up: the minimum wage is now at \$15 per hour, from 2025 a 40-hour week is mandatory, everything else counts as overtime and has to be paid accordingly. “During

“You have to change when the facts change”, says David Prosperi who runs an almond processing business near Madera. Prosperi is also known as “the oracle”, a nickname Mark Arax gave him in his 2019 book “The Dreamt Land”. Prosperi, who at the time didn’t want to be named, gave a bleak assessment of how ‘cheap money’ had flooded agriculture in the San Joaquin Valley and ruined it in the process. “I’ve gone through three of these cycles, and none of them has been crazier than this one. (...) Today, you can be carrying a debt of eight grand an acre, and they’ll let you borrow twelve grand an acre to plant more almonds and pistachios. Equity and cheap interest rates means oversupply. And oversupply means a demand for water that cannot be met. The Federal Reserve can print all the phony money it wants. But it can’t print water. We can put off the national debt, but we can’t put off the day of reckoning here”⁷. By 2019, Prosperi had already sold his almond orchards and focused on processing.



No U-Turn here ...

harvest the costs will be enormous”, says Prosperi. The Farm Bill can skewer the picture, making crop failure more lucrative than yield. Farm insurance safeguards against crop loss through pests and weather events such as hail. The payout is linked to the five-year yield average. “Depending on the almond price it may be more lucrative to not spray almonds, let the worms get in and claim insurance.” When the almond price dropped as low as \$1.25 to \$1.60, the insurance payout might still be \$2.25 due to the five year average rule. And then there is Wall Street and outside investment. Investment companies have long seen the profit in almonds and have driven land prices up through financing unsustainable expansion, says Prosperi who sees a 1980s style farm crisis in the making in the valley. The trend he told author Mark Arax about in 2019 continued: banks gave loans based on over inflated land value, and farmers borrowed huge sums which they will be unable to pay back. Now, farmers are at risk of losing their orchards.



Clearing an acre of almond trees costs \$1000

Getting out and going bankrupt

In October 2024 the website AgAlert featured the plight of Madera farmer Amrik Singh Basra who is facing bankruptcy as SGMA groundwater pumping restrictions are starting to take effect. “In the Madera Subbasin, where Basra farms, “we, unfortunately, have tons of domestic wells that go dry,” said Stephanie Anagnoson, Madera County director of water and natural resources and manager of the county’s groundwater agency. Since 2014, more than 900 dry wells have been reported in the county.

Pumping restrictions issued to keep more wells from going dry have left Basra without enough water to farm, undercutting his ability to pay off investments he made in his land. AgAlert writes: “Between 2017 and 2021, Basra borrowed \$3.5 million to improve his farming operation. The winegrapes had fallen out of favor, so he tore out the grapevines and planted more almonds. He had been told, erroneously, that SGMA would prohibit drilling new wells, so while he could, he drilled four—at a cost of \$500,000 each—to ensure his trees would have water. Now, Basra is barred from using the wells to extract all the water he needs—an aspect of SGMA that blindsided him. This year, as his new trees finally came into production, he gave them 6 inches less water than usual. In doing so, he incurred penalties for over-pumping and left the trees parched, producing an undersized crop. Already insufficient, Basra’s groundwater allocation will drop by more than half by 2040. The limits on his ranch’s farming potential have caused its value to decline from \$9 million several years ago to less than \$4 million. The entirety of his debt exceeds that amount. Suddenly overextended, Basra’s bank called on the loans, leaving him little choice but to file for bankruptcy”⁸.

It’s unsurprising that some farmers are blindsided by SGMA, in particular when their farms are in a ‘white area’. Jed Webster is farm manager at AgriLand, the second biggest almond and pistachio contractor in the San Joaquin Valley. The company takes care of 30,000 acres of nut orchards. So-called ‘white areas’ are particularly hard hit by SGMA because they are not part of a water district, says Webster. Historically farmers had a choice to join a water district, which obliged them to contribute financially to water infrastructure projects like building dams, reservoirs and canals. Those who stayed out and didn’t pay



It's cheaper to just walk away ...



... leaving the trees to die

up now find themselves in 'white areas'. They have to depend on surface water and get deliveries from water districts only if there is a surplus. Costs for such water can be high.

Each water district has to come up with a sustainable water management plan, and in many areas that's work in progress. For 'white areas' in Madera County the plan assumes an average annual rainfall of 12 inches, with half of the water likely used by the trees, while the remaining six inches are recharging the aquifer. Farmers are therefore given credits for six inches of water which is the amount they are allowed to pump from the ground. The quantities of water that can be pumped will be gradually reduced year on year, until restrictions come fully into force in 2040. With fertile soils that have a very high SOM content, Burroughs Farms manages to grow almonds with just 24.5 inches of water, but for conventional farms 36 inches is the minimum needed, says Webster. Which means farmers in 'white areas' will have a 30-inch shortfall. They will concentrate the water on the most productive areas, the rest will have to be fallowed, he says. He estimates that 10% of almond acres at present are being pulled out without any plan to replant. It costs about \$1,000 to clear trees off an acre of land, which has some farmers and investment

companies simply walk away, leaving the trees to die. Across the county one can spot such abandoned orchards with row upon row of black tree skeletons.

The climate crisis is exacerbating the problem. In 2024, an unseasonal heatwave at the beginning of June brought several days with temperatures of 105°F. At this early stage, with the nuts still developing, the trees can't withstand the heat and shut down: they produce the usual number of nuts but the kernels are a lot smaller which negatively affects quality and price.

Webster's prognosis: where almonds cannot be grown profitably land will be abandoned. Pistachio trees can be productive for up to 80 years (almonds just 20), they can deal with hotter conditions and more saline soils, but the profit margins are not as high. Solar farms may be the more lucrative option.

West side woes

On the west side of the San Joaquin you can glimpse the future. Leave Mendota to the south, past the walls, razor wire fences and watch towers of a Federal Correction Facility, and you see the first of many solar farms: acres and acres of solar panels on bare ground.



The 'table' at Lasgoity's 'casino'

Half a mile or so further, a mix of oats, wheat and barley seeds go into a newly plowed field, the tractor pulling the seed drill is barely visible in the cloud of dust. John Lasgoity has rented 5,700 acres from the Westlands Water District. He is sowing a dairy feed mix. The clay soil is extremely fertile, he explains. Planting will be finished by November 6th, after that he can only hope for rain for the seeds to germinate – these are dry farm acres, there are no wells and no water allocations. “This is my casino right here”, he says. If there is enough rain at the right time he stands to make \$1.5 million, if it doesn't rain, he'll harvest nothing and loses around \$340,000, the money he had to spend on inputs such as seed and herbicides. “Out of 10 years I have two really good ones, four in which I lose what I put in and the rest is break even”. A good year means getting 2.5 to three inches of rain at the right time. In a terrible year the seeds never make it out of the ground. In a bad year the grains are only sheep feed. Lasgoity keeps 1,250 Rambouillet

ewes which he brings in to glean after the harvest in a good year, or to make the most of what little did grow in a bad year. He also has some almond orchards and grapes near Firebaugh, but water has become far too expensive to make them profitable. He prefers 'his casino' on the west side: land he maintains through dry farming and grazing until the water district has found a buyer for it. He shows us⁹ a field he farmed for five years until it was sold to a solar company – it looks just as barren as the solar farm we passed earlier. Will he be farming in five years or even ten years' time? He shrugs his shoulders. Who knows?



Solar farm south of Mendota



Part 2: Ranching is making a comeback in the San Joaquin Valley



Bohna explains the grazing system

Diane Bohna and her righthand man, Abe Alvarez, meet us close to the gate of the 7,600 acre pasture she rents from the University of California, Merced.

It's a beautiful but hot day in late October, a sea of yellow grasses seems to stretch as far as the Sierra foothills to the east. As we slowly bump along a barely visible dirt track, Bohna points out vernal pools, a kind of seasonal wetland where

a layer of clay in the soil, a hardpan, prevents rainwater from immediately percolating into the aquifer. Even this late in the season the pools retain some moisture, sustaining a rich community of plants, insects and animals. Like the rolling grassland, they were typical for this part of the San Joaquin Valley before settlers started cultivating the land. "It looked very different when we took on this land in 2021", says Bohna, there was hardly any grass left between bare patches of exposed soil.

Bohna is a 5th generation rancher and she never wanted to do anything but raise cows and be a rancher in the cowboy tradition. She loves cows, "they are my babies", and she lets her cows be cows: herd animals that co-evolved with grass. She was an early adopter of Allan Savory's principles of holistic management and says she was lucky to train with him. It's the knowledge, the insights and the experience she's gained since then that enabled her to turn the 7,600 totally overgrazed acres into dense grassland within three years. "In the first year we were lucky and



The 'mountain cows' are good mums

got a wet winter”, says Bohna. There was still a seedbank of native grasses in the soil, and having the cattle graze them right – ‘bunched’ as a tight group and for a short period of time – helped reestablish those grasses.

California cowgirl

And then we see the herd, slowly walking and grazing or lying in the high grass, chewing the cud. One cow stands seemingly on her own, away from the others – until we spot the calf which cannot be more than a few hours old. “These cows have just returned from the ‘high country’ to give birth here”, says Bohna. The ranch has 200 yearlings and 850 cow calf pairs, 320 of which are taken to the Sierra Nevada mountains in a cattle drive, the others spend the summer months on irrigated pastures and other ranch land. The ‘mountain cows’ are very special animals, says Bohna. They have to be because the herd spends almost half a year in the high country on their own. The cows are excellent mothers, they have to have a thick coat because it can get very cold in the Sierras, they can thrive on different types of forage and they need to be real herd animals, travel well and be strong and somewhat aggressive because they will have to defend themselves against mountain lions and

bears. The calves spend one summer with their ‘mountain cow’ mums who will teach them what and where to graze and how to behave. “They are heifers in training”, says Bohna. “These cows have to be real athletes”. To get to pastures with an elevation of between 6,000 and 10,000 ft and then roam 30,000 acres of US Forest Service Land they have to be very healthy and robust.

Around September 15th she and her crew gather the animals and bring them back to the valley pasture in a six-day trek. The summer and fall cattle drives, spending a week in the wild and on horseback - it’s Bohna’s favorite time of the year. She points out a steer with curls so thick, he looks like he might wear rollers at night. That’s ‘Curly Bill’, the lead animal. The cows are often afraid of noise, of people, of certain stretches of a path where they might struggle to find safe footing. But “where Curly Bill goes they follow”, says Bohna.

The herd will spend the winter in the valley. There is enough forage to be had on the rangeland now, but in fall the native grasses are dry and after giving birth the cows need some additional nutrients which they get from several mineral licks. In spring Bohna will decide which of the calves will be sold and which animals are fit to become ‘mountain mama’ replacement heifers.

Bringing back native grasses



Clusters of oaks in the Sierra foothills

“Grazing is essential for re-establishing native grasses”, says Billy Freeman, Rangeland Manager at Sierra Foothill Conservancy (SFC)¹⁰. Established in 1996 by the McKenzie family and The Nature Conservancy, the 2,960 acre McKenzie Table Mountain Preserve is situated straight east of Madera. On the drive there, the landscape subtly changes. Orchards make way for more grassland and once we have crossed the San Joaquin River and the Friant dam the road begins to wind up into the foothills. Stands of gnarly oaks begin to appear.



Billy Freeman meets us at the gate

Freeman meets us at the entrance to the Preserve and that’s as good as any place to take a closer look at the grasses. There are cool season C3 grasses which go dormant in summer and photosynthesize during the day. Warm season C4 grasses can thrive in hot weather: they are much more water efficient because photosynthesis happens at night when it’s cooler. They still show a little bit of green even in October. Perennial native grasses have long and deep roots, often 20 – 30 ft. Most pastures in the valley are re-sown regularly with annual Mediterranean grasses which make for much better feed because of their high sugar content. The roots grow to just two or three feet and, like other non-native annuals, they are green and palatable earlier and compete heavily with the long rooted native varieties. In order to re-establish native grasses Freeman has to time very precisely when and for how long the cattle are allowed to graze: non-native species will be green, rich in sugar and palatable earlier than the native species and therefore be grazed harder. That leaves them little or no chance to develop seeds and mature. Because the annual grasses are so tasty, native species get grazed lightly which exposes the growth nodes and once the cattle have been moved these grasses will be able to develop seed heads. Over time, native species recover and soil fertility increases.



Crash course in grasses: C4 Deer Grass

The mystery of valley grasses

No one knows what the San Joaquin Valley looked like before it was settled once the Gold Rush was over. Much of the valley floor was swamp. There were no cattle, the grazing animals were Tule elk, mule deer and, on the valley floor, pronghorns. “A herd of 5,000 elks may have grazed an area for a day”, says Freeman, “there were predators so they stayed bunched. They never over-trampled the creeks by hanging out there because that’s where the predators were waiting”. Not only the Tule elk have gone, soil consistency and the availability of water have changed completely. “It’s unknowable what the vegetation in the San Joaquin Valley looked like 200 years ago. It could have been all bunch grasses or forbs and bunch grasses or native annuals or a combination”. The goal of the SFC therefore isn’t to try and re-establish native grasses everywhere, but to improve soil health as defined by Point Blue Conservation, a California based wildlife conservation and research non-profit organization. Among the criteria are SOM, water infiltration rates, and bulk density (compaction). At present SFC has 2-3% SOM, says Freeman, and a compost seed trial is under way to establish whether a 1/8th inch of compost will help to improve microbiology and soil fertility faster. Can it ‘super charge’ establishment of perennials – that is the question.



The cattle know when the new grass is out on the mountain top

Frequency, intensity, timing...

In 2015, Freeman and his colleagues started a high impact grazing trial on two acres of SFC land. It’s grazed once a year for 24hrs with 125 cow/calf pairs. “We are seeing a lot of changes”, says Freeman. The level of biodiversity and water infiltration has increased. The bank of the creek was eroded, the cattle rounded the sharp edge off and the vegetation has come back on the bank, there are cottonwoods and willows once again. And the thick layers of dead grass which prevented fresh growth have gone, grazing has restarted decomposition. 90 acres of riparian pastures have been re-established next to creeks by having them grazed once or twice a year for four to six days.

Freeman has a grazing plan for the entire year. The goal is a balanced ecology, which, in the long term, will benefit profit, too. Achieving that means micro-managing every detail. Freeman spends a lot of time on horseback, the state of the pastures across the whole area has to be assessed at least once a week: how much trampling has there been, how much dung and urine have the animals left behind, which species have the cows hit hardest? In winter cattle go after native species, rich in lignin and energy, in spring they prefer young palatable grasses. On the basis of the weekly assessment the decision is taken where and when the cattle move next: if a species is desirable, get the animals out, if the species is undesirable – leave them longer. “You have to have an excellent mental picture of the entire system”, says Freeman.

Learning from the cows

“One year we noticed that the cattle hung out near the creek but suddenly moved up to the hill top. We followed them to see what was happening and found that they moved as soon as grasses there were ready. Now we use this to manage species by letting the cows to the hill top earlier or later”, says Freeman. He distinguishes between conservation grazing which aims to eradicate non-native species to help oaks for example, and regenerative grazing where the goal is to restore the whole habitat - which is what SFC aims to do. “We are lucky to be in cattle driving distance from the mountains.” Freeman works with several ranchers who bring cattle from pastures as far away as Utah. We see some animals that have just arrived and are recovering from the trans-



Will a layer of compost help native grasses to establish faster?



Acclimatizing after returning from pastures as far away as Utah

port, several calves caught pneumonia and had to be treated, the black coat of other animals has a brown-reddish tint, a sign of malnutrition. Until they leave again in early summer they will be grazing pastures with high biodiversity.

How many animals overwinter at SFC varies. In fall the team assesses the amount of residual forage. The amount of germination rain in November and December determines how well different species do and in the 3rd week of March they extrapolate from their findings throughout the past months when the cattle will have to leave. Like Diane Bohna, Freeman wants sturdy, moderately sized cows that are happy to cover rough terrain and walk uphill and maintain good body condition on a variety of feed.

Could ranching make a comeback?

The ecosystem in the San Joaquin Valley is only slightly different from that in the foothills. The first step would be for almond growers to do what Burroughs Farms has been doing for several years now: grow cover crops to increase soil health, says Freeman. Then Mediterranean grasses could be established. They can be grazed and made into ranchland if and when the almond trees go. Finally, native grasses could be reintroduced.

Freeman's colleague Chris Velez is a land steward at SFC. He believes there are native grass varieties that are suitable for all areas in the valley and that it's possible to establish them – including more heat tolerant C3 grasses such as Purple Needlegrass (*Stipa pulchra*) and salt tolerant varieties, such as Alkali Sacaton. Such grasses

would be needed on the west side of the valley where soils can be very saline. There is even a 'Saltgrass' which looks like Bermuda grass and has such high salinity that native American tribes used it to harvested salt from it. "It is the best salt anyone could have", he says.

In his previous job Velez successfully established strips of native grasses in orchards. The grasses are dormant in summer but keep the dust down, increase soil fertility and can be mowed. Seeds are available from a number of specialized seed companies.

Perennial grasses grow slower; to make sure they are not outcompeted by annuals the seedbank for annuals needs to be eradicated. At SFC the team works with 'burn piles'. They take all the fine fuels (leaves, small branches, twigs...) from a fallen tree, assemble them into small piles and burn them. The fire will be hot enough to destroy the seedbank of annuals that is there. Ash, when it gets wet, forms a dense film that seals the soil and caps it. To prevent that it is carefully raked off before native grass seeds of the varieties the team want to establish are spread. The area then needs to be grazed so that residual annuals are kept down and the perennials have a better chance to form seeds and spread.

Freeman and Velez are sure that with the help of well-planned and targeted grazing perennial, native grasses can be re-established in the valley and ranching can make a comeback. But it will take time, careful planning, money and a lot of effort.

Part 3 Wanted: land managers – only sheep and cattle need apply



Overlooking the Dairy Creek Golf Course



The sheep were brought to this pasture just hours ago

We meet Rob Rutherford at the Dairy Creek Golf Course overlooking what now is the target practice area. “The golf course sits in a watershed area, it’s a very sensitive habitat”, says Rutherford. After 9 holes had to be ‘retired’ due to a lack of water, the attempt to ‘bring back nature’ meant that Italian thistles took over as the dominant species. Until Rutherford brought in his sheep.

Prior to his retirement Rutherford was a professor in the Animal Science department at Cal Poly in San Luis Obispo. Raising sheep has been a life long passion, doing so in a holistic grazing system came later. “You have to be ready to see and hear in order to see and hear”, he says. The moment he was ready arrived in the late 80s, when he took a holistic management course with Allan Savory. The ecosystem is highly complex to the point that we are unable to fully understand it, says Rutherford. And the system is constantly in flux, we can’t freeze a situation in time. Often the attitude is: ‘this works, let’s repeat it’ – until it doesn’t work anymore. The result is chaos and “that’s where we are with industrial agriculture at present, we’ve reached a tipping point”. In his opinion the scientific approach of isolating and changing single variables works great in a lab, but field conditions need a holistic approach that is capable of noting changes and reacting to them.

What’s that got to do with a water starved golf course? In 2013 Rutherford started to bring in sheep for grazing. It did not take long until 90% of Italian thistle were gone because “the sheep have changed the biology”, says Rutherford.

“Microbes love a thatched roof”

There are roughly 70 acres of grazing land around the golf course. Rutherford takes us to a hill top with plenty of dry grasses, small shrubs and forbs. The 26 sheep grazing there had been moved to the paddock that morning and would stay for about two weeks. Overgrazing¹¹ is a big issue during the growing season and the sheep have to be moved every two or three days, he explains, but at the end of October the grasses grow slowly so that grazing periods can be longer. Grazing encourages green growth which enhances soil biology, and better soil means higher water infiltration and retention capacity¹².

The sheep are ‘Dorper’, a wool shedding breed originally from South Africa and a cross between Dorsets and Black Headed Persians. All were born on the golf course. They are good mums, says Rutherford and the meat is good, too. In his opinion sheep are excellent for holistic grazing because they can be easily moved. Cattle on the other hand have more weight impact and they are easier to control with just one hot wire -



Dorpers are a wool shedding breed

sheep can be true escape artists., sheep and cattle differ in grazing behavior and preference, he says. Sheep prefer forbs, grasses between three and six inches in high are a secondary choice. While cows rip off grasses with their tongues, sheep pinch with their lips and pull. Cattle prefer grasses to forbs, however, there is always overlap depending upon the situation. They only bite too deep if they are not moved often enough and the grasses are under three inches tall to begin with.

Earning their keep

Rutherford just sold 36 five months old lambs, weighing between 60 to 65 pounds – not a bad deal at \$3 per pound, but the market for sheep meat is unpredictable and varies from year to year. Ranchers should be paid for the ecosystem services their animals deliver, he says, they are “as important as fire fighters or mail men”. Attitudes need to shift among ranchers too: “The more soil biology and chemistry you have, the more animals you can support and the more fire prevention you get”. Vegetation management for fire protection is gaining in popularity and occasionally ranchers and livestock managers get paid. The question is whether it is enough to make it worth their while. “We don’t know what ecosystem services are worth”, says Rutherford, “the Reagan Library was protected by grazed area around the building which acted as a fire break and saved the library from burning down in 2019”¹³. Together with others he is lobbying Cal Fire (California Department of Forestry and Fire Protection) to change the regulations and officially recognize grazing as a fire fighting tool. Costs for fire insurance have increased drama-



Habitat creation increases biodiversity, including hummingbirds....

tically, so much so that it’s become unaffordable for many home owners, some properties can’t be insured at any price. In view of the recent fires that ravaged parts of Los Angeles premiums will likely increase further. “If home owners were to get a rebate if their houses were surrounded by a fire break, they would likely be happy to pay a rancher to bring in animals to maintain it”.

Rutherford has been teaching holistic management since 1992, initially as an experimental course, but it proved extremely popular and was always oversubscribed. He is still in touch with quite a few of his former students. One of them is Katie Brown who has been involved in a solar project in the San Joaquin Valley that demonstrates how solar farms and holistic grazing can benefit the environment and help ranchers make money.



Kit Foxes, cattle and sheep

Katie Brown now runs her own company Holistic Energy Solutions

For 11 years, Brown worked for the biological and environmental service company Althouse and Mead on the Topaz Solar farm project run by a solar and wind energy company¹⁴. At the time, the project in San Luis Obispo County off Highway 58 was the largest solar farm in the world and even today it still is among the biggest. And unlike the solar farms we saw near Mendota, at Topaz managed grazing was part of the plan from the start. The land at the southwestern side of the San Joaquin Valley gets an average annual rainfall of just 11 inches. Dry farming was possible but so uneconomical that many farmers were going out of business. The company bought the land from different farmers with the owner of the largest parcel selling the land but keeping the grazing rights.

The project started in 2008. For the required permits a general audit of plants and wildlife was done and a monitoring program put in place. A number of rare plant and animal species were found on the land, among them the San Joaquin Kit Fox, a once common species which is now on the endangered species list. The company had to buy four acres of 'mitigation land' for every one acre of land with solar panels. For the 3,500 acre solar farm that meant the acquisition of approximately 15,000 additional acres, which surround

the solar panel fields extending in foothills of the Temblor Mountain Range. At present the mitigation land is grazed by 400 head of cattle, once the necessary infrastructure is in place – electric fences, water troughs - the land can sustain a herd of one to two thousand animals.

Bringing back native grasses

Brown came on board during the preparation phase in 2011. Initially, there was wheat and barley stubble across most of the fields, other areas were grazed with cattle but grass growth was uneven and there were many bare patches. Because of the heavy traffic during the construction phase bare soil was almost an asset as it reduced the fire risk. Because static solar panels¹⁵ were used, the average height of the panels lowest edge varied between 18 and 24 inches – for maximum efficiency the solar panels need to be level.

The area was seeded with a perennial and annual seed mix containing grass and forb species that naturally occur in the area such as foothill needle grass, pine blue grass and goldfields. Seeding ideally happens in fall, because the winter months are likely to bring rain and some seeds need a cold spell before they will germinate. For seeding during the summer months such seeds will be stored in a fridge beforehand, says Brown. There are now a number of seed companies specializing in the production of native grass seeds, but some varieties had to be pre-ordered to be available on time and in sufficient quantities. "During the first season the grasses grew in clearly discernible drill seed rows, after three years the drilled rows were barely visible and completely gone by year five", says Brown.

During the first season the plan was to mow and 'weed whack', but the grasses established so well that they realized they'd need to move in sheep immediately.

Today, the grass under the solar panels is grazed by 3,000 to 6,000 sheep, at about 60 sheep per acre. The animals are split into three groups which graze 40 to 60 acres at a time and are moved to a new pasture every two to three days. This grazing system implements a holistic approach to land management and mimics the way large ruminants such as bison used to move across the landscape in large herds.

Devising the grazing plans from day one was just one of Katie Brown's many tasks. She also conducted biological surveys, monitoring for drainage and soil erosion and managing fire fuel loads¹⁶. Vegetation monitoring was a critical part of ensuring the San Joaquin kit fox habitat remained intact during construction and into the site's operation.¹⁷

The grazing rota

Until Brown left Althouse and Meade in summer of 2024 to set up her own company, she visited the site once a week. She trained the rancher who now devises his own grazing plans. He, too, is on site at least once a week and employs several shepherds who check on the sheep – primarily Rambouillet with occasional Suffolk ram crosses – at least once a day. The sheep lamb from November to January and could do so on the solar site, but the owner likes to bring them close to his ranch where he can monitor the ewes more closely and help them during lambing if needed. The grazing season on the solar panel pasture begins in late February or early March and the sheep do two to three passes a year.

Combining solar panels with holistic grazing has delivered unexpected and very positive results. The panels create a unique microclimate that changes the plant species composition. Because they provide shade, evaporation, transpiration and ambient temperature are reduced. That leads to increased biodiversity, native perennials from dormant seed banks start to flourish and the total biomass production goes up which means the number of grazing animals can be increased.

Brown believes that 'solar farm ranching' or 'agrivoltaics' can work financially – ranchers get paid for the grazing services, their sheep provide wool and meat for local markets. The cost of grazing a solar site is typically cheaper for the solar farm owner than traditional herbicide treatment. Mentalities need to change though, "at present most see solar farms as a loss of ranch land, but it doesn't have to be".

Solar grazing is rapidly expanding, not just across the western states but the whole of the US. Because the piles of most solar panels are low, only sheep seem to be suitable for grazing while cattle will do well on wind farms, or, as with the Topaz Solar Farm, grazing the surrounding mitigation land. But solar technology is developing fast. In Europe farmers are working with solar panels with piles high enough for cattle to walk and graze underneath. The panels follow the sun and provide shade for the animals. Agro-forestry projects now often combine trees and solar panels. The panels can be turned upright: if they are installed in rows, spaced in a way that a drill or combine can pass between them, a solar farm can be combined not just with pastures, but arable crops such as wheat or barley, too¹⁸.

As for the San Joaquin Valley Brown believes that fallowed land there can be restored to a native mix of perennial and annual vegetation. For any such project grazing is essential – sheep can even graze salt grasses – and holistic management is the tool.

Part 4: “Land needs cattle more than we need meat”



Ranching on the San Andreas Fault – ‘not my fault’ quips Morris

Joe Morris is a cattle rancher in San Juan Bautista, though that is not the job description he chooses. “I’m a manager of relationships”, he says. Morris grew up in San Francisco where his father was a civil rights lawyer. He studied liberal arts, went to Theology Grad School, worked for the Catholic church in Venezuela for two years, and taught Spanish until, by sheer accident, he stumbled across Wendell Berry’s book ‘Home Economics: 14 Essays’. “It blew up my mind”, says Morris. Suddenly it seemed possible to combine ranching with working for the common good. When a friend introduced him to Allan Savory’s writing just a week later, his mind was made up: he’d follow the family tradition after all and become a rancher.



The ranchland is stunningly beautiful

“We have been in ranching since 1880”, says Morris. His great-great grandfather Richard O’Neill was a butcher and came to San Francisco from Ireland in 1848. He sold beef to miners during the Gold Rush until his friend, fellow Irishman and the founder of a bank, asked him to manage his portfolio of foreclosed ranches. How the family got from ranching 250,000 acres north of San Diego to a 200 acre farm in San Juan Bautista is a riveting story – for another day. Joe Morris got his introduction to ranching through his grandfather to whom he was extremely close. “I visited him every summer, I felt at home with cattle and horses, leading the life of a cowboy”. Once at university he spent the summer months working on ranches across the West, in Montana, Wyoming, Arizona, and New Mexico. His experience of working for nearly two years on a ranch with close to one million acres in Nevada made him reassess his options. He loved the cowboy life but, as a Catholic, he also felt that he wanted to do something for the common good. With the thinking and practice of Wendell Berry and Allan Savory that goal suddenly seemed within reach, and Morris returned to San Juan Bautista in 1991. His grandfather had died, the ranch was leased to a farmer who was in his eighties, ready to retire, and his parents agreed to what seemed like a low risk plan: “You might not make much money, but you won’t lose any either”, was their comment.



Oaks grow bushy until the lead stem has properly developed



It has not rained in six months ...

There are no recipes

Morris found pictures from the 1950s when it was customary to plow before seeding Mediterranean grasses for haying. “The practice went out of fashion in the 80s, but the damage to the soil was done”. From the start his goal was to “increase the eco function of the land while we are using it”. At the time farmers also used moderate stocking rates, management was considered unnecessary, the animals were left to roam and hopefully find what they needed. “Attend to the needs of the whole--livestock, plants and soil microbes” is what Morris calls his ‘Savory Framework’. He explains how this translates into what he does on the farm: Observe!

Look for evidence of soil health.

Is the ground covered?

Look for biodiversity.

Green plants in their growing phase photosynthesize and feed the soil by supplying sugar. They don’t do that in their reproductive stage when they are building seeds.

Manage disturbance by paying attention to three variables: timing, stock density and recovery.

The timing needs to benefit the whole community. What effects do variations in grazing patterns have such as high stock density and longer or shorter recovery periods?

Assess the new pattern that emerges: what does it do for the soil and the community of plants, animals and insects?

The principals are very similar to what Billy Freeman works with at Sierra Foothill Conservancy. But there are no recipes, says Morris.

We walk through the pasture next to the farmhouse – which sits directly on the San Andreas fault line. “Not my fault”, quips Morris. He points out the huge variety of cool and warm season grasses. He says he was extremely surprised when he learnt in a workshop run by ecologist and soil scientist Christine Jones that grasses only make up about 10% of the species in grassland, the rest are forbs, broad leaves, shrubs and lots of flowers.

The area gets on average just 16 inches of rain, most of it from October to April. The grasses start to dry up by April. At the time of our visit it hadn’t rained in six months but there were vernal pools with rushes and, nearby, patches of wet soil underneath green salt grasses.

Unlike Billy Freeman Morris does not use grazing to establish particular varieties but perennials in general which were in short supply when he took on the ranch. One exception are the oak trees which have grown to 25ft in 30 years. Once he took the cattle out to provide rest the saplings grew bushy, forming a protective cordon around the lead stem which grew tall. Using this strategy, the oaks transformed themselves from shrubby, stunted plants to nice tall trees.



... but there is water in the vernal pool

Stacking enterprises

Morris has been finishing cattle since the late 90s. He buys animals aged 15-20 months directly from ranchers or at auction and finishes them at 24 to 30 months. This gives him the flexibility he needs for grass management and to react to factors such as weather events. The second enterprise is an Angus and Hereford cow/calf herd. To raise and finish all animals on the ranch wouldn't be feasible because such a system is complicated, inflexible, and the market does not always reward it, says Morris. Lastly, he grazes cattle for other ranchers.

Morris readily admits that he's made mistakes. "The model is to grow and get big and I fell for it", he says. He overextended and acquired and leased more land than he could manage on his own. That meant hiring someone, training him in holistic management and paying him accordingly – which meant there was little profit left. He is in the process of downsizing and reducing the stress he is under. "It would have been better if I had not increased the land base so much".



Salt grasses

Morris markets the meat of his animals directly. Customers order $\frac{1}{4}$ or $\frac{1}{2}$ animal online which means they will receive a mix of meats. Items like liver, heart, tongue, oxtail and bones can be added to the order. He has seven animals slaughtered at a time. The slaughter facility he uses is in northern California. After driving there once to deliver the animals and a second time a week later to collect the meat he then has to deliver it. Between June and November he delivers orders to 60 people in five different pick up locations on each trip. The schedule is tight, customers have 15 minutes for pick up. The meat isn't cheap, but Morris has a customer base of around 400 people who are willing to pay not just for high quality meat from grass-fed animals but also for the land stewardship and ecoservices provided. "Farmers and ranchers need to be creative. They need to diversify and layer businesses, add a glamping site, for example". And they have to find ways to make eco services pay. "The services are valuable and a market will get created".



The ground underneath is wet

Doing the groundwork: TomKat Ranch Educational Foundation (TKREF)



Entrance to the ranch



Dakota Glueck, rancher and cattle coordinator at TomKat

How do you produce good food, improve soil quality and biodiversity, provide habitat for wildlife and pollinators, put in place practices that mitigate climate change and stay profitable?

The team at TomKat Ranch Educational Foundation (TKREF) in Pescadero aims to do all of the above. Their team of ranchers and scientists work together to assess soil health and biodiversity, establish baselines, develop and test different agricultural practices and management systems, and independently verify outcomes. ‘Regenerative Ranching’ aims to benefit the environment and rural communities, provide good food and food security, promote the health and wellness of humans as well as animal welfare and be profitable for farmers and ranchers.



One acre bale grazing trial

The right kind of animals on the right kind of land

Dakota Glueck is a rancher and cattle coordinator at TomKat Ranch. Growing up in Los Angeles as a ‘city kid’, ranching wasn’t exactly a childhood dream. After finishing school, he spent a year in China to learn martial arts which left him time to read a lot. On his return to California he decided to do a degree in natural resource management at UC Berkley. The course included forestry, fishery, ranching and farming. “I fell in love with dryland systems”, says Glueck.

Pescadero is a tiny village next to Hwy.1 and the Pacific, some 14 miles south of Half Moon Bay. Follow the road winding into the hills for a mile or so and you reach the ranch. “The coastal prairies are one of the most endangered ecosystems in California”, says Glueck. “Rangeland ecosystems are particularly vulnerable and need grazing”.

Just 800 acres of the 1,800 acre ranch are pastures, the rest is coastal scrub and oak wood. There are around 120 beef cattle, a mix of Angus and Hereford crossed with Red Devon, Short Horn, Corriente, a breed brought in by the Spanish, or Bonsmara, a breed that originates from South Africa. Right now, 50 cow calf pairs are on a small pasture used for a grazing trial. It’s a ‘safe to fail



Energy for the hot wire

trial' on just one acre of land with the goal to improve soil health and water infiltration. Hay bales containing a species mix of annuals and broad leaves like birdsfoot trefoil, were spread and form a thick layer on the ground. The animals were brought on to the pasture in early October and are now at the tail end of a month of grazing. The trial is in its third year, but already intensive bale grazing for one month with high stock density has yielded astonishing results: a 600% increase in water infiltration, a 300% increase in biomass, more mycorrhizae and there is now a colony of termites which are good for the soil. In a few days the animals will move to the 2nd bale grazing trial. They will again stay for one month. Once they leave, native perennial grasses such as purple needle grass, blue wild rye, California barley, California broom and California oat grass will be direct seeded.



Grassfed beef is nutrient dense and healthy

Holistic grazing has already led to a 30% to 70% increase in native grass species. The question is how to best kickstart the establishment of perennials and how to get them to be more productive. "How do we get a lot of biomass from native perennials and very good nutrition?" is the key question, says Glueck.

The cows calve in April when plenty of forage is available and stay with their mums for 10 months. They are weaned in February and finishing age is 24 to 30 months. TomKat Ranch's marketing arm, LeftCoast GrassFed, slaughters 16 to 20 animals per year for meat. The ranch keeps some replacement heifers and surplus animals are sold to other regenerative ranches nearby.

The cows also provide eco grazing services on the nearby Root Down Farm. The farmer raises outdoor chickens, turkeys and ducks, as well as heritage pigs which reside in arches outdoor. The pigs do 'light tillage', removing the thick thatch layer on the pasture. Thanks to the fertilizer they leave in form of their poo, there is so much vegetative growth that cattle have to be brought in for grazing.

Regenerating the land

Apart from the cattle the farm also has a herd of 200 cashmere goats. They are perfect for controlling the growth of brush and reduce the fire hazard says Hayley Strohm, the farm's Regenerative Science Coordinator. Without goats farmers need to either mow regularly or spray herbicides. At present the team is figuring out where and when to put the goats for best effect.

Strohm used to work in nature restoration and conservancy where the focus was on eradicating invasive species. An approach that doesn't really work, she says, with mowing and herbicides the species will just come back. At TomKat Ranch the goal is to increase biodiversity. Grassland, forests, woodlands and scrubs all have their place, says Strohm. Each thrives under particular circumstances and is an ecosystem in its own right. Scrubs emerge when there is too little disturbance and the grasses die. They can develop into very biodiverse environments for plant species, wildlife, birds and insects. We are surrounded by managed landscapes, says Strohm, the Indigenous People who lived here, specifically the



Controlled burn ...



... with Cal Fire in charge

Raymaytush, used fire management to maintain the coastal prairies because grasslands provided better hunting grounds. There were also starchy bulbs, and seed plants that could be used for food and reeds, willows, and other fibrous plants which were needed for basket making. “This landscape has been shaped by people for thousands of years”. The ‘original condition’ before it was settled by Indigenous People cannot be re-established because conditions have changed – soil, climate and seed availability are very different from what they were several thousand years ago. Taking the animals off the land would not restore the type of nature that existed before humans started managing the landscape either. But not grazing the coastal prairies would result in more fire-prone scrub land with little diversity.

Learning from Indigenous People

Controlled burns were a method frequently used by Indigenous People. They burnt small areas and they did so often. Strohm shows us where the team has just done a controlled burn as a trial. They worked with Cal Fire personnel who have to be present on the day. The advice therefore was to burn a larger area and leave a longer interval to the next burn. The downside of burning a larger area with large fuel loads is that such fires can burn hotter and have the potential to seal the soil surface which reduces water infiltration – the soil becomes hydrophobic.

The planned burn was done just a few days before our visit. The 100 acre site on a steep slope was surrounded by a bare strip which had been mowed and then heavily grazed. The fire was started at the top and burned around 60 acres. The recovery of the site and the implications

for biodiversity and soil quality will be closely monitored. Like the Sierra Foothill Conservancy, TomKat Ranch works with Point Blue Conservation Science, also a non-profit. Among the parameters they test across the ranch are water infiltration ratios, soil carbon content, soil nutrients and bulk density. At the burn site not also the vegetation composition will be monitored but also the bird diversity in a 100m radius.

Grazing and controlled burns differ in impact. One can do a lot with grazing says Strohm but once a tipping point has been reached ‘accelerated’ practices such as fire may have to be used for a more effective impact.



‘safety strips’ were mowed and grazed hard



Hayley Strohm, the farm's Regenerative Coordinator

Holistic planned grazing on the ranch began in 2011. Samples were taken to establish a baseline for the plants growing on the pastures. Out of 75 pastures monitored at the ranch only eight contained perennial species. After two years of holistic grazing 57 out of 75 pastures contained perennial species. The monitoring was last repeated in 2018 and now perennials were present in 70 out of 75 samples. On several pastures a mix of native perennials are now dominant, says Strohm. The grazing plans used are similar to those at the Sierra Foothill Conservancy: the cows graze competing annuals hard and perennials just to the point where it's beneficial. Timing is everything.

Research matters

Very few ranchers and farmers will have the time and money to conduct elaborate trials as how to best re-establish native perennials or get rid of species that tend to crowd them out. And that is one reason why non-profits like TomKat Ranch are so important: in small, multi-year, controlled 'safe to fail' trials different practices can be tested and the results monitored. The analysis of the data shows which methods are effective, which are not and why. What are the specific parameters and conditions that facilitate the desired outcome? Such research provides guidance for farmers and ranchers to choose the right 'tool' to achieve the intended outcome on their ranch and to scale up the procedure.

Cooperation is crucial. In 2010, Point Blue therefore started the Rangeland Monitoring Network in California which now compares soil measures such as water infiltration and compaction on more than 100 farms and ranches across California.

The team at TomKat Ranch takes a holistic approach in other ways, too, by looking at the whole food chain, from processing and marketing to nutritional values - grass-fed beef is a nutrient-dense and healthy food.

Kathy Webster is the farm's Food Advocacy Manager and she sees her role as making connections. Holistic management benefits the environment, it increases biodiversity and soil health. But ranching is also a business and needs to be profitable. One way to achieve that is to encourage more people to eat grass-fed beef.



At TomKat everything gets mapped and monitored

Creating a market

For Webster, getting beef into schools, universities and hospitals is key. In 2018, TomKat Ranch¹⁹ started the Beef2Institution initiative and hosted ranchers like Joe Morris as well as university, hospital and school food procurement managers to discuss how to get meat from local, grass-fed animals into institutions. Most institutional kitchens source everything from companies such as US Foods or Sysco. And some schools can't buy raw meat because they either don't have access to a full kitchen or are not set up to receive raw beef product. The Beef2Institution initiative was able to create cooked products, like cooked beef crumble and patties, which schools can use.



What you need for a water infiltration test

Webster also began working with Santana Diaz, a trained chef and Director of Culinary Operations & Innovation at UC Davis Medical Center. Their goal is to get more local, grass-fed beef into all UC campuses and five affiliated hospitals and Diaz has been coming up with ideas for meals that are tasty but use cheaper cuts of meat.

TomKat Ranch was part of the Bionutrient Institute's nutrient-density beef study, to connect nutrients in beef to land management. The study included an indepth survey of genetics, acres, plants and forages, grazing practices, as well as data on how often the animals were moved, soil samples, forage samples, fecal samples collected seven days before slaughter, and ribeye samples.

A unique sales pitch

Sound data on the nutritional value of grass-fed beef and the research done by Point Blue on the benefits of holistic grazing for soil quality and biodiversity have helped Webster to come up with unique arguments why buying grass-fed beef from ranchers at a fair price through public procurement ticks all the boxes. Hospitals and other institutions have sustainability (climate) goals. Webster does not focus on the low emissions of locally produced, grass-fed meat nor does she attempt to compete on price. Her argument is: buy grass-fed meat for a fair price as a means to reach the sustainability goals of your organization or institution. With the research done at TomKat Ranch, she has the data to show that beef produced in a holistic grazing system increases biodiversity and soil health, helps to mitigate drought conditions and flooding, creates wildlife habitat and, as a healthy, nutrient dense food, actually gives chefs and the people they cater for a lot of bang for their buck.

Puzzle pieces coming together

SGMA will have a significant impact on agriculture in the San Joaquin Valley, 25% to 30% of agricultural land can likely no longer be irrigated. Business as usual is not an option, there will be changes, lots of them.

If land is not to be fallowed and left bare, if soil erosion and dust storms are to be prevented, a new, holistic approach to farming and ranching is needed. And by the looks of it the elements are in place.

The San Joaquin Valley used to be grassland and research shows that native perennial grasses can be re-established, as can forbs, flowers and shrubs. Such grasslands need grazing and ranchers have the animals to do the job, including sheep able to graze salt grasses.

Maximizing meat production however can no longer be the one and only goal. Grass-fed animals take longer to finish, and to be profitable ranchers have to sell such meat for a fairly high price to an affluent customer base. But as Joe Morris put it: Land needs cattle more than we need meat. We have to look at the ecoservices ranchers can provide through their ruminant 'land managers' within a holistic management framework.

Here are some of the services provided:

- Research has established the benefits of managed grazing for the environment, soil health, water infiltration and retention, biodiversity and wildlife.
- Solar farms can be undersown with (native) grasses if there are sheep and cattle to graze them. In addition to the production of clean energy, such grasslands would benefit the environment – see above.
- Grazing is a proven fire prevention tool – having ruminants maintain a buffer zone around properties would be a huge contribution to fire safety.

We are used to invoices for 'services provided' – ecoservices, too, need to be paid for. A market for such services is slowly developing. Ranchers in the San Joaquin Valley will probably never make as much money per acre as a grower can with a sufficiently irrigated almond orchard. But if ranchers can combine the income from the sale of grass-fed meat (and possibly wool and leather) with payments for ecoservices from managed grazing, they should be able to make a decent living. And the TomKat Ranch approach of linking the price of meat not just to its high nutrient density per portion, but also to the ecoservices organizations, institutions and companies need to reach their sustainability goals – it's win-win for everyone.

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Photos © Martin Kunz
(except where specifically mentioned).

Footnotes

- 1 <https://www.ppic.org/publication/policy-brief-the-future-of-agriculture-in-the-san-joaquin-valley/>
- 2 <https://californiawaterblog.com/2025/01/12/california-water-under-a-trump-administration-part-1-of-2>
- 3 <https://www.eea.europa.eu/en/analysis/indicators/drought-impact-on-ecosystems-in-europe>
- 4 https://www.martin-haeusling.eu/images/publikationen/Klimawandel2020_EnglischeVersion_final.pdf
- 5 https://ucanr.edu/sites/UCCE_LR/files/180943.pdf
- 6 Aaron Gilbreath: The Heart of California. Exploring the San Joaquin Valley, 2020, p 31
- 7 Mark Arax The Dreamt Land page 508
- 8 <https://www.agalert.com/california-ag-news/archives/october-23-2024/farms-face-ruin-as-groundwater-law-takes-its-toll/>
- 9 I'm travelling with my husband and photographer, Martin Kunz
- 10 <https://sierrafoothill.org/>
- 11 Overgrazing is re-biting a plant before it has recovered from a previous grazing.
- 12 The impacts of the animals from saliva, urine, wool, hair, feces, and trampling all contribute to increasing the biological and chemical complexity of the site.
- 13 <https://www.washingtonpost.com/history/2019/10/30/priceless-history-inside-reagan-library-now-threatened-by-fast-moving-wildfire/>
- 14 Berkshire Hathaway Renewable Energy
- 15 Because of advances in technology many solar farms now install tracking panels (rather than static panels) which follow the sun the way a sunflower does.
- 16 Keeping the access roads open at all times is just one of the complicated regulations that have to be complied with. The fire department requires the whole area to have been grazed once by June 1st. The height of the vegetation has to be maintained between 8-12 inches. The RDM (residual dry matter) cannot be less than 800 pounds per acre at the end of the year for San Joaquin kit fox habitat management ...
- 17 Part of monitoring their population included tracking individual animals which was done in collaboration with the Endangered Species Recovery Program (ESRP). An assessment of how the Kit Fox population fared was published in California Fish and Wildlife 107(3):231-248; 2021
- 18 Brown added that in the US, a trial combining cattle and solar is going on at White Oak Pastures in Georgia on Will Harris' ranch (he currently has sheep and solar and is a leader in holistic management). Ecological changes are documented as well. Results have not yet been published but there are a few presentations and preliminary information on their website. <https://www.siliconranch.com/cattletracker/>
- 19 In collaboration with Healthcare Without Harm and Community Alliance With Family Farmers