

Presentation to the Joint Interim Standing Committee on Natural Resources, Nevada State Legislature

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- I. Growing Biodiversity and Climate Resilience with Regenerative Agriculture
- II. TomKat Ranch: Learning Lab and Educational Ranch
 - A. Regenerative Ranching
 - 1. TomKat Ranch demonstrates the practices and benefits of regenerative rangeland management and supports the tools that speed its adoption
 - B. Fork to Farm
 - 1. Our Fork to Farm partnerships influence the way society eats in order to accelerate the adoption of regenerative agriculture
 - C. Gathering for Action
 - 1. TomKat Ranch brings people together for meaningful conversations to catalyze the transition to a regenerative agriculture system
- III. Why We Care. A Promising Solution to Many Problems
 - A. Climate Stability
 - 1. Decrease GHG through carbon sequestration
 - B. Rural Economics
 - 1. Increase profit for farmers and ranchers
 - C. Health and Wellness
 - 1. Increase human well-being of body, mind, and spirit
 - D. Water
 - 1. Improve water quality and increase holding capacity
 - E. Soil
 - 1. Improve soil health and fertility and reduce topsoil loss
 - F. Animal Welfare
 - 1. Improve well-being and performance of livestock
 - G. Biodiversity
 - 1. Steward ecosystems to be productive and diverse
 - H. Food Security
 - 1. Increase net productivity and resilience of our working lands
- IV. Planet Is Out of Balance
 - A. 4 Key Cycles:
 - 1. Water
 - 2. Energy
 - 3. Carbon/Mineral
 - 4. Community Dynamics (relationships between living creatures)
 - B. Signs of Distress:
 - 1. Drought, Flood, Fire
 - 2. Temperature Extremes

- 3. Biodiversity Loss
 - 4. Food Scarcity
- C. Regenerative Agriculture is best way we know to re-balance cycles, fix ecosystem function, & increase resilience.
- V. Our partner in science - Point Blue Conservation Science
- VI. Six Core Principles of Soil Health
 - A. Understand Context of your farm operation
 - B. Minimize soil disturbance
 - C. Maximize crop diversity
 - D. Keep the soil covered
 - E. Maintain living roots year round
 - F. Integrate livestock
- VII. Regenerative Agriculture Rehydrates Soils
- VIII. Improves Water Cycle Function
 - A. Non-effective Rainfall
 - B. Effective Rainfall
- IX. Restores the Energy Cycle
 - A. Bare Soil
 - 1. Heats up
 - 2. Loses water
 - 3. Can't support plants
 - 4. Can't cool earth
 - B. Covered Soil
 - 1. Stays cool
 - 2. Retains water
 - 3. Supports plant life
 - 4. "Sweats" evaporation, cools the earth
- X. Restores the Mineral Cycle
 - A. Traditional grazing practices
 - B. Regenerative grazing practices
- XI. Increase Economic Stability
 - A. Morris Grassfed
 - 1. 6,000+ acres at Hollister Hills State Recreational Park.
 - 2. 1994: Regenerative planned grazing.
 - a) Increased soil cover 60% to 90%.
 - b) Support wildlife habitat & health.
 - c) Increased stocking capacity 100% - 300%.
 - d) Received ~50% discount on leases because of commitment to grow long-term productivity and resilience of the land.
 - e) www.landandmanagement.org
- XII. Protects and Restores Biodiversity (ground cover and grasses)
 - A. TomKat Ranch Ecological Performance with Planned Grazing
- XIII. Protects and Restores Biodiversity (grass species)
 - A. 2011: 8 of 75 pastures with native perennials grasses present

- B. 2013: 58 of 75 pastures with native perennials grasses present
 - C. 2018: 70 of 75 pastures with native perennial grasses present
 - D. Presence of Native Perennial Grasses on TomKat Ranch on Implementing Planned Livestock Grazing
- XIV. Protects and Restores Biodiversity (animal species)
 - A. With planned grazing, most of ranch open to wildlife while herd moves pastures.
 - B. Livestock can enhance the ecosystem and co-exist with sensitive species & keystone predators.
 - C. TomKat Ranch is home to badgers, lions, bobcats, coyotes, and over 100 bird species.
- XV. Increases Resilience
 - A. Soil Compaction
 - 1. 67% of points meet or exceed NRCS goals.
 - 2. 2015-18, bulk density improved on average.
 - B. Water Infiltration
 - 1. 36 sites infiltrate at 5 mins or faster per 1" of rain.
 - 2. Avg infiltration is 9.8" per hour. (A 100-year storm in SF is 1.32" per hour.)
 - C. Soil Carbon
 - 1. Avg soil carbon at 4%.
 - 2. 2014-18 (drought) - 46% of sites gained at 0-10 cm, 10-40 cm, or both.
 - 3. 2018-21 - 70% of sites gained.
- XVI. Regenerative Agriculture Compounding Effects
 - A. More Photosynthesis > More Soil Organic Matter > More Water Holding Capacity > More Photosynthesis (etc.)
 - B. Water as proxy for carbon
 - C. Safeguard economic sustainability and food security
 - D. Increase and protect biodiversity
 - E. 2045 Climate Neutrality
- XVII. Potential Outcomes. What Could 1 Million Acres Do?
 - A. Economic Livelihood
 - 1. Improve land productivity, economic gains/resilience/food
 - B. Climate Stability
 - 1. Sequester up to ¼ million more metric tonnes Co2eq per year
 - C. Water Storage
 - 1. Capture and hold up to 32.4 billion more gallons of water in the soil
 - D. Biodiversity
 - 1. Support healthy, diverse plant and wildlife communities
- XVIII. What is a Regenerative Practice?
 - A. Regenerative ranching incorporates grazing animals into ecosystem processes which...
 - B. Supports healthy wildlife habitat, builds soil carbon, stimulates the microbial lifecycle, and increases soil water-holding capacity
 - 1. Photosynthesis drives the system
 - 2. Trampling plants covers bare ground keeping soil moist
 - 3. Cow dung feeds microbial communities
 - 4. Photosynthesis drives the system

- a) Perennial grasses have deep roots that allow water to move deep into the soils and produce food for microbes and fungi
 - (1) Roots continue to grow as plants are effectively grazed
 - b) Annual grasses have shallow roots
- XIX. Conservation and Carbon Farming Practices & Co-benefits
 - A. Conservation and Carbon Farming Practices
 - 1. Compost
 - 2. Cover crops
 - 3. Native grasses
 - 4. Hedgerow
 - 5. Riparian restoration
 - 6. Windbreak
 - B. Co-benefits
 - 1. Water quality
 - 2. More soil water retention and storage
 - 3. Habitat for pollinators and wildlife
 - 4. Integrated pest management
 - 5. Better forage
 - 6. Reduced soil erosion
 - 7. Improve irrigation efficiency
 - 8. Reduces soil compaction
- XX. Regenerative Agriculture Makes Working Lands A Key Climate Solution
 - A. This is at a national scale if all land is participating.
 - B. 4 of 29 recognized and funded NRCS practices for reducing emissions.
 - 1. PG = Prescribed Grazing
 - 2. NM = Nitrogen Management
 - 3. CC = Cover Crops
 - 4. NT = No Till
- XXI. Creates Synergies With More Practices
 - A. Goal 1 is to increase soil organic matter
 - B. Soil carbon data from a regenerative ranch/crop operation
 - C. (Brown Ranch in Bismarck) as new USDA NRCS practices were added.
 - 1. Gabe gets 12x revenue versus his neighbors.
 - 2. This can address wage issues for farm laborers.
 - 3. The impact of these practices is greater than the sum of their parts.
 - 4. Thinking Holistically: this is activating complex biological systems.
- XXII. Practices at TomKat Ranch: reduce fire Fuel Loads with Goats & prescribed burns with CalFire
 - A. Goal 2 is to reduce fire fuel loads on the ranch. We recently incorporated browsers/goats. Goats graze fuel sources to reduce ladder fuels that enable flames to spread into the canopy of trees. We graze them along roadsides and around structures. Goats also add manure to the soil enhancing its organic matter. We conduct controlled burns with the assistance of Cal Fire and will be monitoring the ecological outcomes with the help of Point Blue.
- XXIII. Practices: Incorporate Farming & Livestock as Appropriate

- XXIV. Regenerated Landscapes: Example of Chihuahuan Desert (Mexico)
- A. Same tools (cattle), different practice due to different paradigm
 - B. Same tool has been used, but applied differently. Land management on the right went through a paradigm shift, owners understood which principles they needed to address and addressed them. And therefore are making progress toward repairing cycles, holding onto rainfall.
- XXV. Regenerated Landscapes: Loess Plateau In China
- XXVI. Regenerated Landscapes: Brown's Ranch In North Dakota
- XXVII. Regenerated Landscapes: Holistic Planned Grazing In Utah
- A. These are photos taken in the same year on three different riparian areas in the northern half of Rich County UT. The first was grazed season-long (May 15- Sep 15) annually for many years. This riparian area gets very little growing-season grazing recovery, perhaps a couple of weeks in early April. Then the cows are on it grazing the rest of summer.
 - B. The second is also a BLM allotment, the allotment is also grazed the same May-Sep dates, but it is divided into three pastures rather than one so each Pasture receives some growing season recovery each year, roughly 1.5 months grazed and 2-3 months recovery annually.
 - C. The final photo is also a BLM allotment that is in part of a multi-pasture rotation system. It is grazed 1-2 weeks each growing season and receives months of growing season rest. In this last system, 2 pastures are totally rested each year and rest is also rotated among pastures.
 - D. **My premise is that it is the growing season rest that is the principal difference among these sites since the soils, elevation, water, and weather are similar.**
- XXVIII. Thank you!
- A. For more information contact wendy@tomkatranch.org
- XXIX. Appendix: The Power and Potential of Regenerative Agriculture



The Power and Potential of Regenerative Agriculture

TomKat Ranch is an 1,800-acre working ranch and learning laboratory in the San Francisco Bay Area with a mission to “raise healthy food on working lands in a way that regenerates the planet and inspires others to action.”

Agriculture is the primary way that humans interact with the planet. How we choose to manage agricultural lands has serious social, environmental, and economic impacts. Through rigorous monitoring and on-the-ground experimentation at TomKat Ranch and from observing numerous examples across the world, we’ve seen that **regenerative agriculture has the power and potential to be a meaningful and scalable solution to many of the most pressing challenges of our time.**

Why do we need to change how we farm and ranch?

- Industrial farming and ranching practices are harmful to soil health. In the fertile Corn Belt it is estimated that 24 percent - 46 percent of topsoil has been lost due to farming practices¹. This reduces agriculture yields and threatens food security.
- Many farmers and ranchers suffer from hopelessness. In an examination of the suicide rates among occupational groups, a study published in 2020 revealed the suicide rate for farmers, ranchers, and agricultural managers was significantly higher than that of the overall population and the 6th highest rate among occupational groups.²
- The industrial food system is wildly inefficient. It spends approximately 10 calories of energy to produce just 1 calorie of food.³

¹Yale Environment 360 - <https://e360.yale.edu/features/how-the-loss-of-soil-is-sacrificing-americas-natural-heritage>

²Penn State Extension - <https://extension.psu.edu/why-we-need-to-keep-talking-about-farm-stress>

³Scientific American - <https://blogs.scientificamerican.com/plugged-in/10-calories-in-1-calorie-out-the-energy-we-spend-on-food/#:~:text=And%2C%20simultaneously%2C%20our%20agricultural%20systems,1%20calorie%20that%20we%20produce.>

Caring for working lands yields impact at scale.

- Around 52% of the land in the United States⁴ and 38% of the globe⁵ is used for agriculture
- Project Drawdown estimates that implementing recommended and evidence-based solutions for food, agriculture, and land use could reduce/sequester by 2050 approximately 226 - 312 billion tons of CO2 equivalents⁶. Each year global emissions are roughly 35 billion tons of CO2 equivalents.

What is regenerative agriculture?

- Regenerative agriculture is the rigorous and continuous pursuit of a food system that is productive, resilient, and able to grow and distribute healthy food, fiber, and fuel without the unsustainable use of natural resources or the unjust treatment of people or animals.
 - In the report “Investing in Regenerative Agriculture,” Paul McMahon of SLM Partners says “Ultimately, we know regenerative agriculture by its outcomes – its environmental, social and economic impacts. The practices and systems that farmers use will vary depending on local context, although they are underpinned by common principles that focus on soil health and emphasize biology over chemical inputs.”⁷

What are the principles of regenerative agriculture?

- Regenerative agriculture is best described through principles (as opposed to practices) because it is highly adaptive and meant to work synergistically with the ecosystem in which it is implemented.
 - The principles of regenerative are⁸:
 - **Understanding the context:** One thing isn’t going to work for every farmer, everywhere.
 - **Minimize disturbance:** Reduce the amount of chemical and physical disturbance (low-or no-tillage).
 - **Maximize diversity (plants and animals):** A way to naturally defend against pests and diseases, while improving soil health and the ecosystem.
 - **Keep the soil covered year-round:** We want to keep soil on the farm – it’s a central aspect of a healthy farm ecosystem.
 - **Maintain a living root year-round:** Soil is alive and needs food to survive – it eats carbon that’s photosynthesized by plants out of the

⁴USDA - <https://www.ers.usda.gov/topics/farm-economy/land-use-land-value-tenure/#:~:text=Agricultural%20production%20is%20a%20major,data%20on%20Major%20Land%20Use>

⁵FAO - <https://www.fao.org/sustainability/news/detail/en/c/1274219/>

⁶Project Drawdown - <https://drawdown.org/sectors/food-agriculture-land-use>

⁷SLM Partners -

<https://static1.squarespace.com/static/651547609b95501c64972f52/t/65c34f35f2f86feb17de51/1707298626704/SLM+Partners+-+Investing+in+Regenerative+Agriculture+-+2024+White+Paper.pdf>

⁸General Mills - <https://www.generalmills.com/how-we-make-it/healthier-planet/environmental-impact/regenerative-agriculture#:~:text=Minimize%20disturbance%3A%20Reduce%20the%20amount,soil%20health%20and%20the%20ecosystem>

atmosphere and pumped below ground. By growing every day of the year, we're maximizing the amount of carbon sequestered to feed the soil and keep it healthy.

- **Integrate livestock:** Integrating grazing livestock wherever possible supports healthy plants and soil.

What are the demonstrated benefits of regenerative agriculture?

- Regenerative agriculture prioritizes soil health, which benefits the climate and producers.
 - Healthy soils are often characterized by high soil organic matter (carbon) content.
 - Regenerative agriculture can increase carbon in the soil, and promotes a stable climate by sequestering atmospheric carbon into the soil.
 - White Oak Pastures increased soil organic matter from 1% to 5% in its soil.
 - TomKat Ranch has seen increases in the carbon content of its soil. During the 2014 - 2018 drought, 46% of sampling sites gained carbon when tested at 0 - 10 cm, 10 - 40 cm, or both. From 2018 - 2021, 70% of sites gained carbon⁹.
 - Peer-reviewed research shows that "Improved management on grazing lands can offset 7-15% of current annual global CO2 emissions."¹⁰
 - Rich carbon-filled soils absorb and safely hold rainwater at higher rates than depleted soils, reducing flood and erosion damage and mitigating the effects of drought.
 - Every 1% increase in soil organic matter results in as much as 20,000 extra gallons of soil water available per acre¹¹.
 - TomKat Ranch has been able to improve the health of its soil so that now its average rate of water infiltration is 9.8" per hour¹². A 100-year storm in its area is 1.32" per hour.
- Regenerative agriculture supports biodiversity.
 - Regenerative organic farming...encourages biodiversity. A rich mix of microorganisms, plants, and animals on the farm creates healthy soil, strong crops, and resilient natural systems that don't require chemical intervention to manage pests and diseases¹³.
 - After implementing regenerative agriculture principles at TomKat Ranch, the detectability of native perennial grasses increased dramatically from 5 of 75 fields having detectable native perennial grasses to 70 of 75 fields. By practicing planned adaptive grazing, the vast majority of a regenerative ranch is free of livestock and open to wildlife. Livestock enhance the ecosystem and co-exist with sensitive species as well as crucial keystone predators like mountain lions. TomKat Ranch is home to over 100 migratory and year-round bird species.

⁹ TomKat Ranch - <https://www.tomkatranch.org/what-we-do/regenerative-ranching/#ranch-data-links>

¹⁰ Mayer et al. 2018; Paustian et al. 2018

¹¹ USDA - <https://www.nrdc.org/bio/lara-bryant/organic-matter-can-improve-your-soils-water-holding-capacity#:~:text=%22Each%201%20percent%20increase%20in,gallons%20more%20water%20per%20acre.%22>

¹² TomKat Ranch - <https://www.tomkatranch.org/what-we-do/regenerative-ranching/#ranch-data-links>

¹³ Rodale Institute - <https://rodaleinstitute.org/why-organic/issues-and-priorities/biodiversity/#:~:text=Regenerative%20organic%20farming%2C%20by%20contrast,to%20manage%20pests%20and%20diseases.>

Some species, such as Swainson's Thrush and Song Sparrow, have increased on the ranch despite an observed decline across Coastal California¹⁴.

- Regenerative agriculture supports thriving ranch/farm businesses.
 - Regenerative producers report higher wellbeing, better health, future security, and profitability¹⁵.
- Regenerative agriculture grows more nutritious food.

Conclusion

Regenerative agriculture is a **scalable and achievable opportunity** to increase the social, economic, and environmental resilience of our food system. Regenerative farms and ranches around the world are discovering and demonstrating ways to develop production systems that feed a growing population and care for a fragile planet.

If you'd like to learn more, there are many ways you can support and contribute to this important work.

¹⁴ TomKat Ranch - <https://www.tomkatranch.org/what-we-do/regenerative-ranching/#ranch-data-links>

¹⁵ Ogilvy, S. et al 2018