

Virtual Fencing Solutions for Regenerative Livestock & Range Management



What is **Virtual Fencing**?

A tool for remotely **Monitoring** and **Controlling** livestock

GPS Tracking

Audio & electrical stimuli for animal
Containment, Exclusion, and Movement control



What is **Virtual** Fencing?

A Rangeland Management Tool

Cost-Effective Regenerative Grazing

Increased Stocking Density

Optimized Forage Utilization

Riparian and Habitat Protection

Fire Fuel Management Burn Area Restoration

Wildlife Migration Friendly

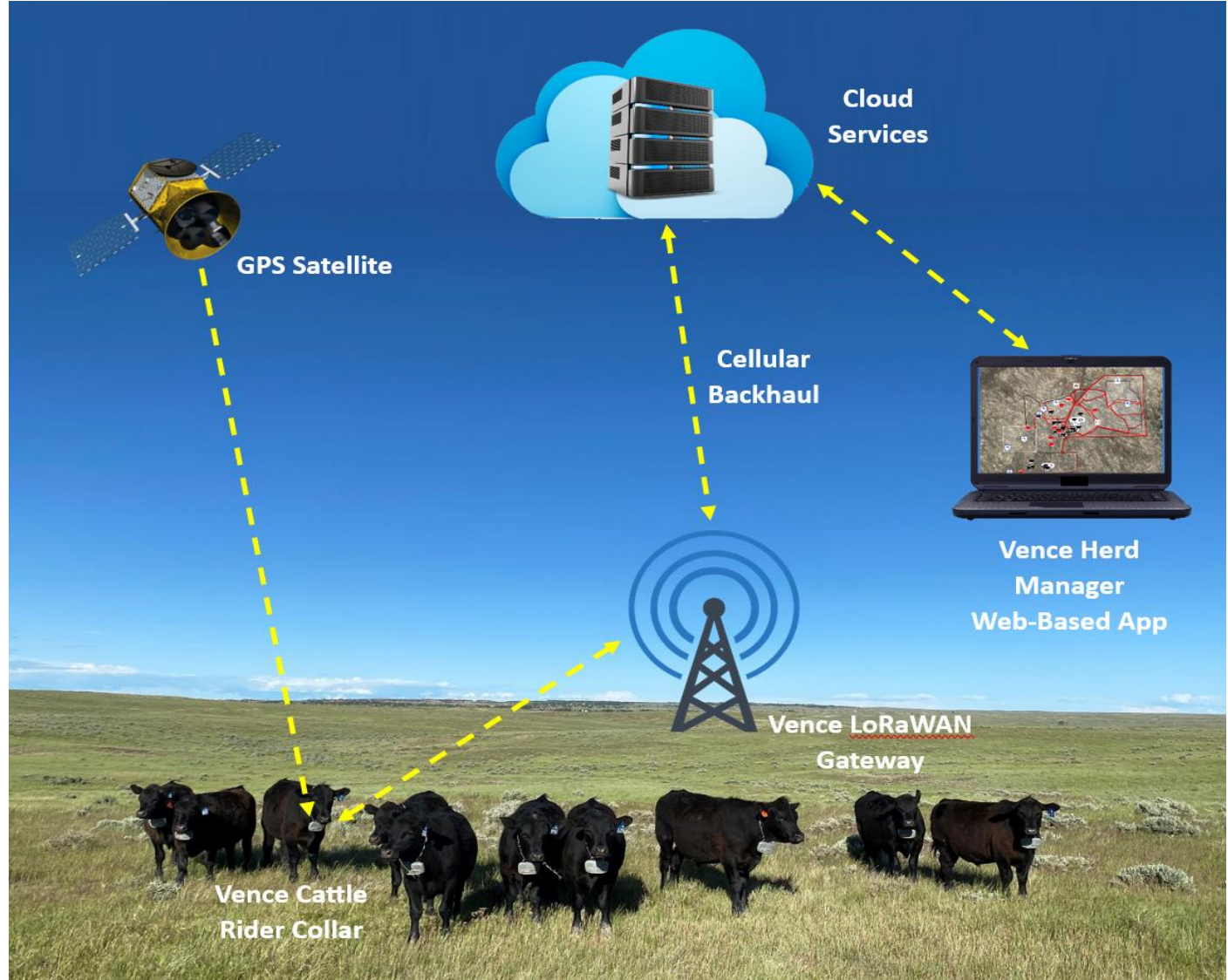


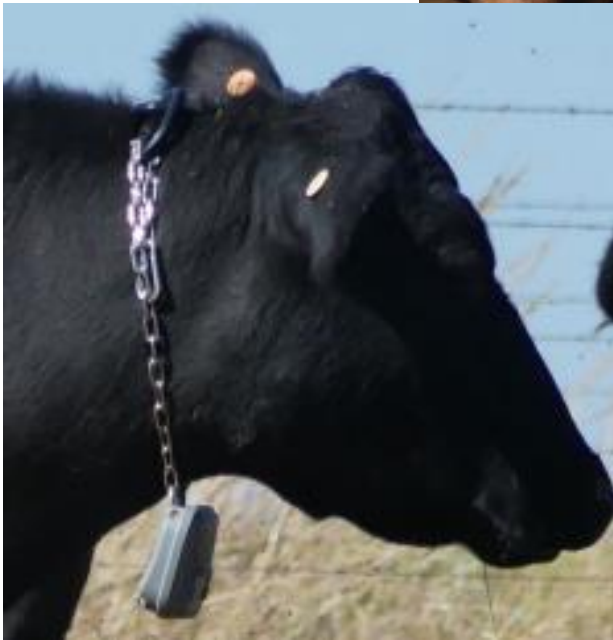
Virtual Fence Success Story



- Last year 75,000 acres burned in the Idaho Salmon-Challis National Forest.
- Due to USFS/BLM post-burn grazing restrictions, permittees were faced with 50% destocking.
- VF allowed ranchers to graze their allotments without reducing their stock.
- 5 producers reported 95% containment, with escapees returning to herd on their own.
- Gathering time:
 - Without VF = 7 days
 - With VF = 6 hours
- Manual Cattle Management:
 - Without VF = 2-3 days per week
 - With VF = 2-3 days in 90-day period

How Vence's Technology Works





Vence Cattle Rider Collar

- LoRa transceiver communicates with and receives instructions from Base Station.
- GPS receiver determines animals' position in relation to Vence boundaries.
- If the animal encroaches on a Vence boundary, the collar deploys sound stimulus followed by sound + electrical stimulus.
- The collars memory capacity allows autonomous operation even when out of range from Base Stations. Up to 16 virtual fence assignments.
- Battery life depends on usage:
 - Daily Moves: 3-6 months
 - Weekly Moves: 6-9 months
 - Tracking Only: 24 months

How does virtual fence work?

- Animals managed via pressure applied by the collar based on location.
- When animal first approaches a boundary a sound warning is applied.
- If animal continue to encroach, a sound plus aversive stimulus is applied.
- Animals are trained to turn away from the collar pressure and return to the herd.
- Virtual fence line is a "one-way gate" animals receive pressure leaving the inclusion zone but receives no pressure when returning.
- When animal returns to the inclusion zone the virtual fence turns back on.





Vence LoRaWAN Base Station

- Base Stations communicate with collars using LoRaWAN technology - ISM Band.
- Cellular Backhaul bridges collar data to the internet.
- Solar Panels allow independent operation in remote areas.
- Depending on the ranch topography, a base station has the capability to provide coverage for 10,000 acres or more.
- Designed to last 10+ years in the field with little to no maintenance.

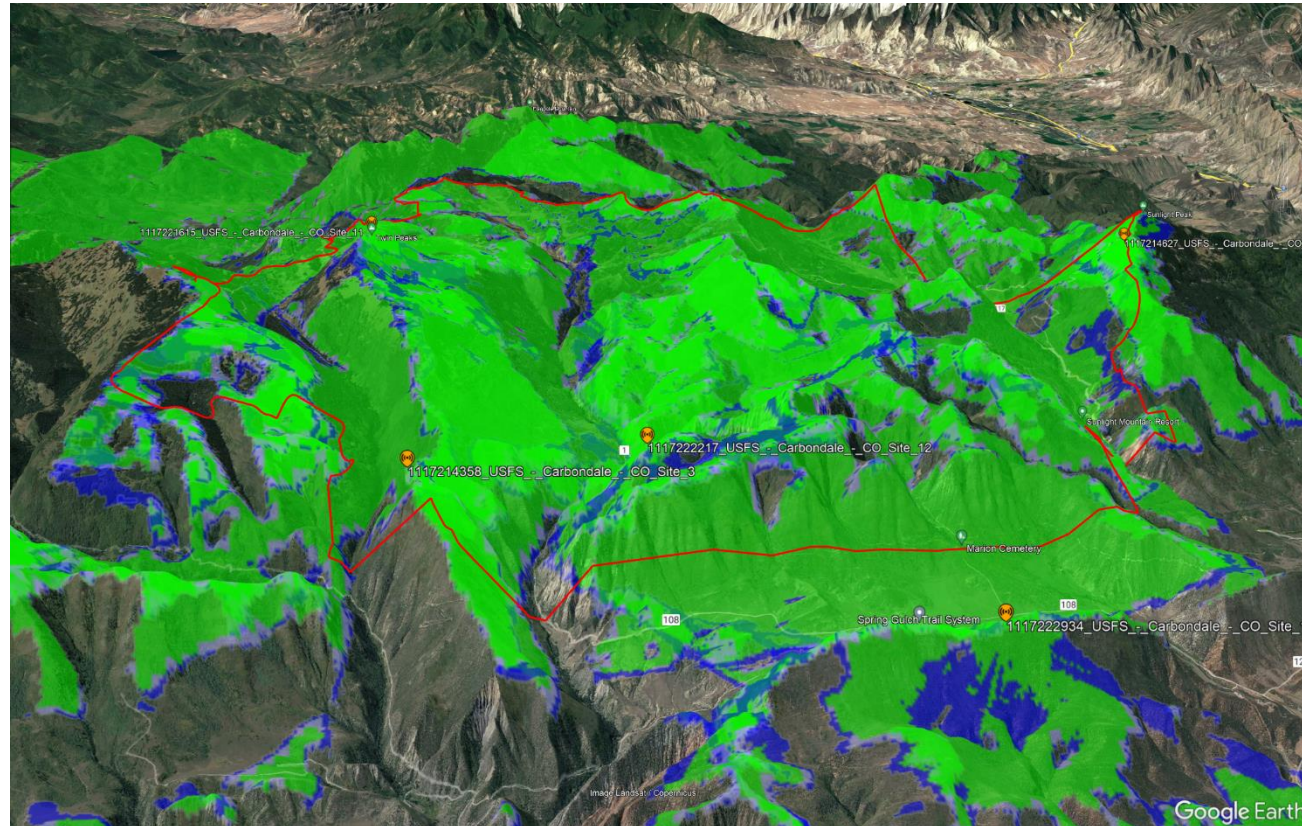
Determining Base Station Placement

Radio Frequency (RF) Planning

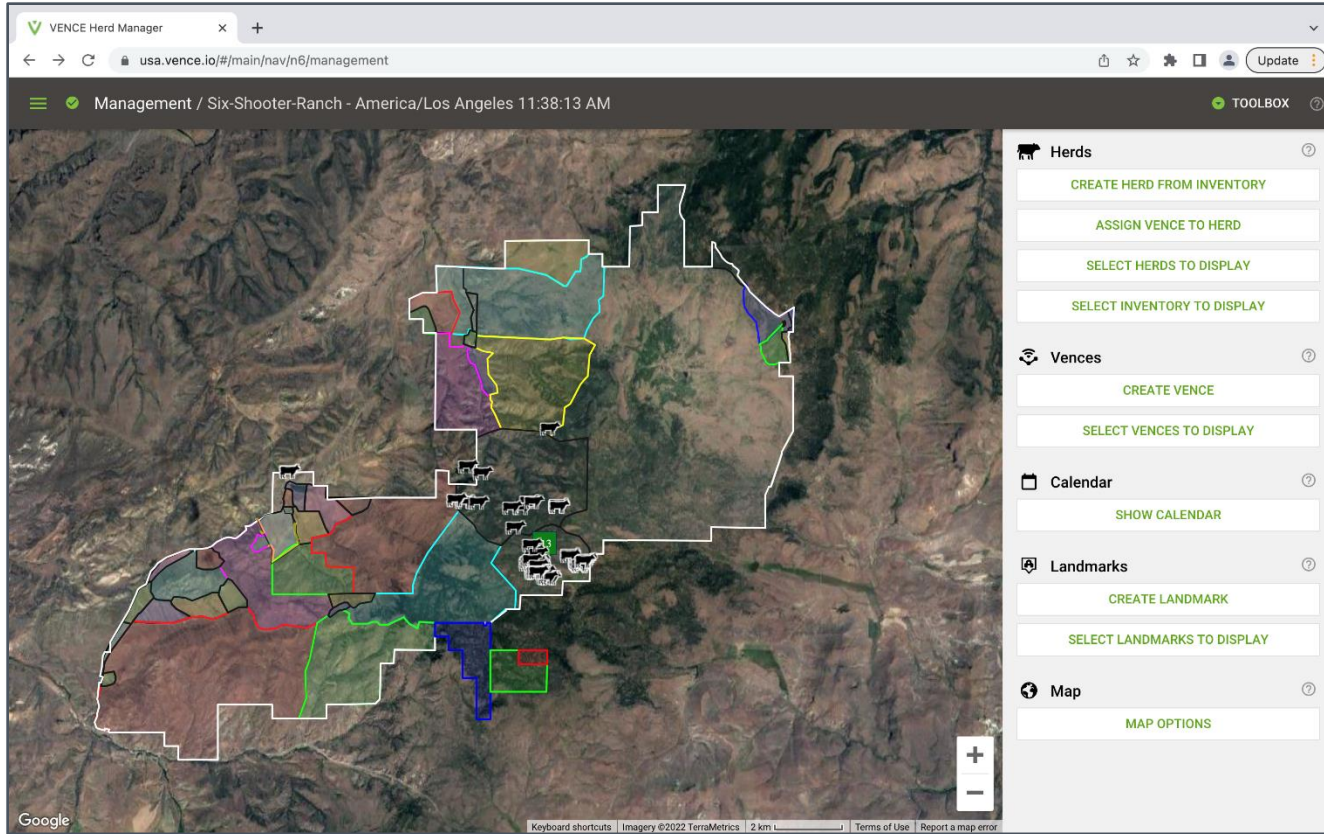
- Model RF coverage to determine the position and number of Base Stations required - based on topography.

Autonomous Collars

- Once virtual fence lines are programmed into collars, they will remain active even in areas with limited/no Base Station coverage.
- This image is an example of how the RF planning due to the topography of this ranch, lead to the deployment of five base stations, represented by the yellow circles provide coverage for approximately 40,000 acres.

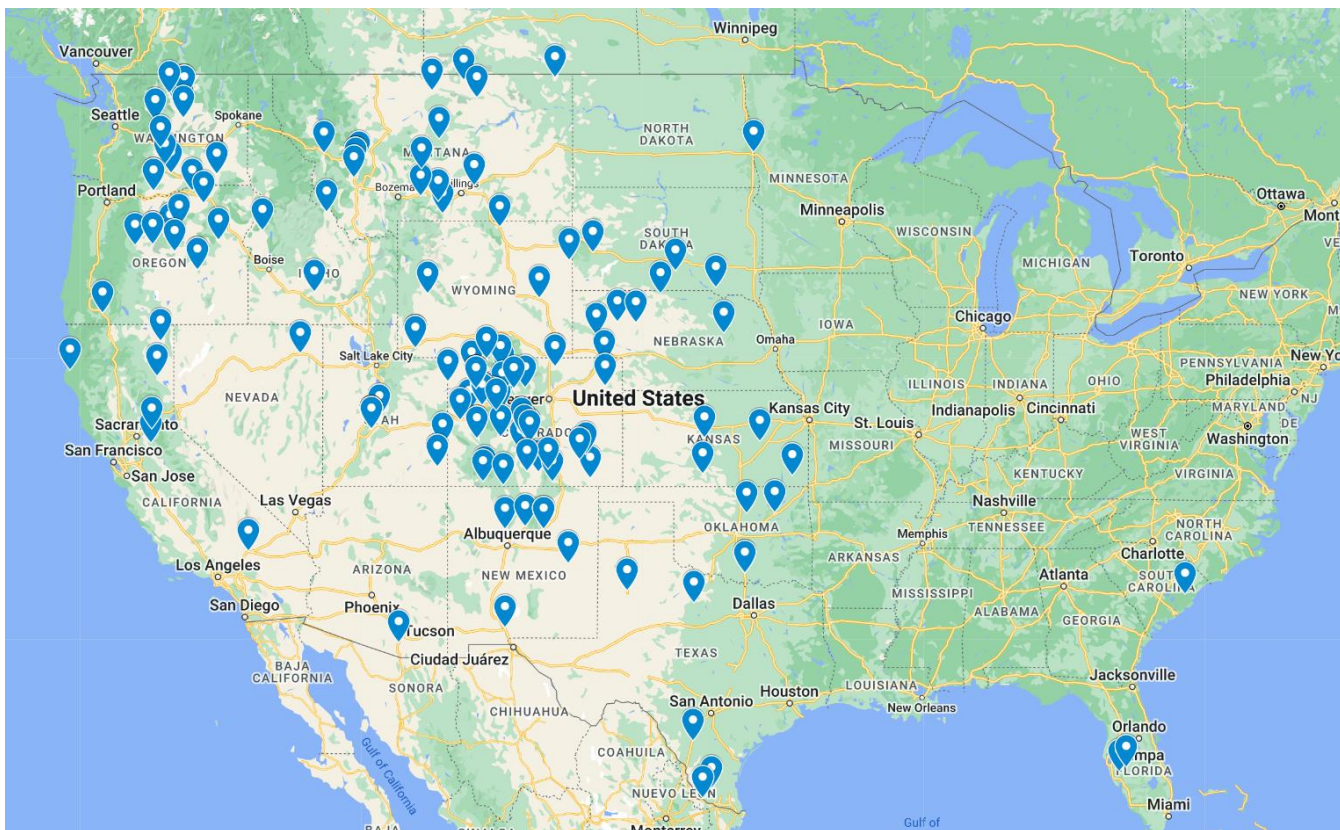


Vence HerdManager Software



- Visualize pastures and key property landmarks. (e.g., physical fences, water sources, roads, etc.)
- Build and schedule virtual fences weeks in advance - modify them as needed.
- Track individual animals and visualize Vence performance via heatmaps.
- Associate Ear Tag IDs to Collar IDs.
- Monitor collar status and battery life.

Vence is the only commercially-scaled VF provider in North America



- Founded in 2016 (First pilot ranch established in Australia in 2017).
- Headquarters in San Diego, CA.
- Acquired by Merck Animal Health (Sept. 2022).
- Deployments in the US and Australia
 - 200+ producers and institutions
 - 50K+ collars
 - 300+ base stations
 - 3M+ acres

Government and Conservancy Partners




University Partners




What is the cost of Vence?

Base Station




\$10,000 self-installed
\$12,500 Vence installed

CattleRider Collar



\$40 per collar per year

Battery



\$10 per battery



| Average Vence Customer (15K acres + 300 head) | |
|-----------------------------------------------|-------------|
| 2 Towers x \$12,500 per Tower | = \$ 25,000 |
| 300 Collars x \$40 per Collar | = \$ 12,000 |
| 300 Batteries x \$10 per Battery | = \$ 3,000 |
| <hr/> | |
| Initial Set-up Cost | \$ 40,000 |
| Annual Recurring Cost | \$ 15,000 |

Vence - 2023 and Beyond



Focused on improvement

Improving Software and Hardware



New Species Trials

Bison + sheep



Product Partnerships

Merck RFID ear tag + Vence Data



Smart Farm Integration

Vence + soil moisture sensors + water level sensors + soil carbon sensors + gate sensors + etc.



Animal Health Metrics

Estrus detection, calving alerts, etc.



Thank you



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