COLLEGE OF AGRICULTURE & LIFE SCIENCES
Natural Resources & the Environment

Cooperative Extension

THE UNIVERSITY OF ARIZONA
Arizona Experiment Station

Virtual Fence 101 for Rangeland Livestock

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WESTERN SARE
Sustainable Agriculture Research & Education

Support from: Marley Endowment for Sustainable Rangeland Stewardship

The Arizona Experiment Station, University of Arizona

Western SARE

USDA-NIFA AFRI

USDA National Institute of Food and Agriculture
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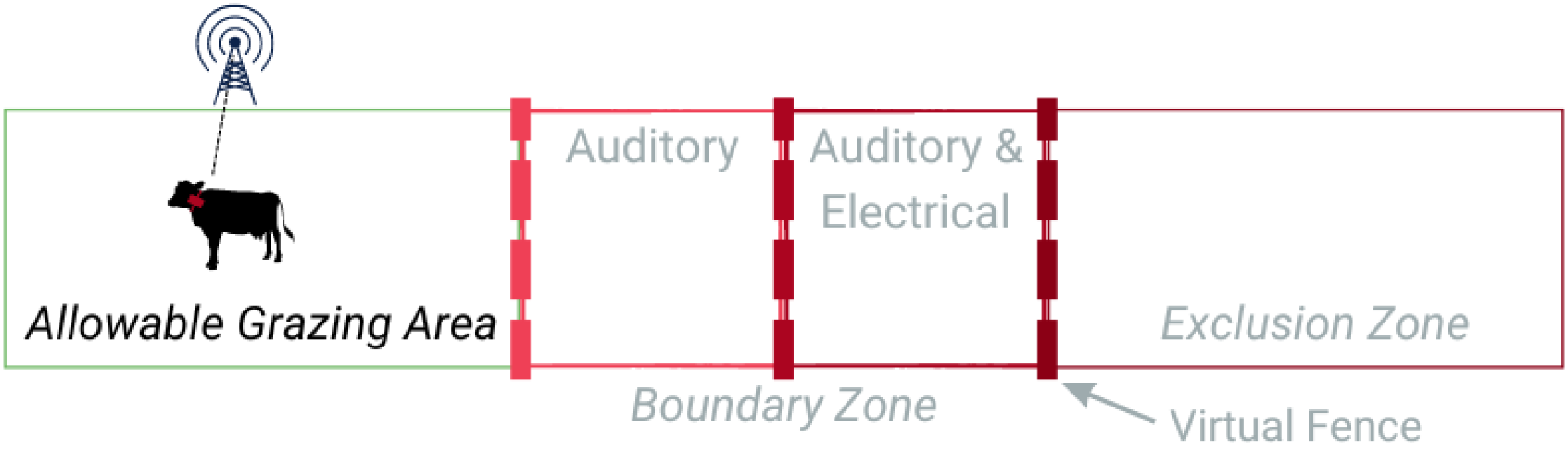
What are Virtual Fences?

Geographic boundary that is programmed into an electronic device, typically a *collar* worn by livestock

Virtual Fence Terminology



Virtual Fence Collars

GPS determines animal's geographic location

Trains animals to stay within areas by auditory and electrical cues

Transmits data to the Internet via radio or cellular network

Commercially Available Virtual Fence Vendors

Nofence

Commercially Available in 2023

VENCE

Commercially Available in 2019

Corral

Commercially Available...Soon?

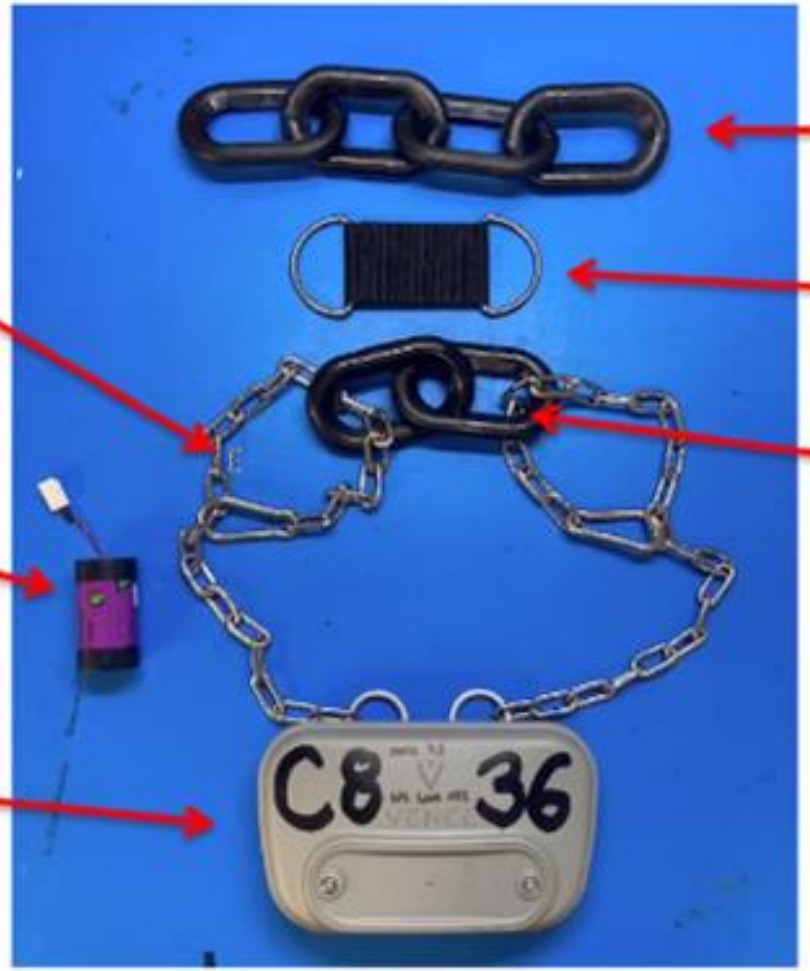
Cattle Rider V2 Chain Collar – Part Descriptions

VENCE

Chain Collar w/Adjustment Carabiners

CR Battery

Cattle Rider Electronics Housing



Optional Large Animal Bridge

Optional Webbing Bridge

Standard Chain Bridge

Note: Chain always loops through the bridge and clips back on itself with the carabiner. Do not clip carabiner directly to bridge.

Nofence

Solar cells

A tough, durable collar with solar panels. Surface scratches will not have a noticeable impact on their efficiency.

Rechargeable battery

While on pasture, the batteries charge using the solar panels. The batteries will last the longest on large, sunny pastures with excellent cell phone coverage.

Bluetooth

Captures signals from shelter beacons, deactivates GPS when the animals are in shelter, locating a collar if you have no cell phone coverage.

Motion sensor

Registers acceleration along three axes, saves energy, and is the basis for further development to provide valuable information about the animal's condition.

Mobile network

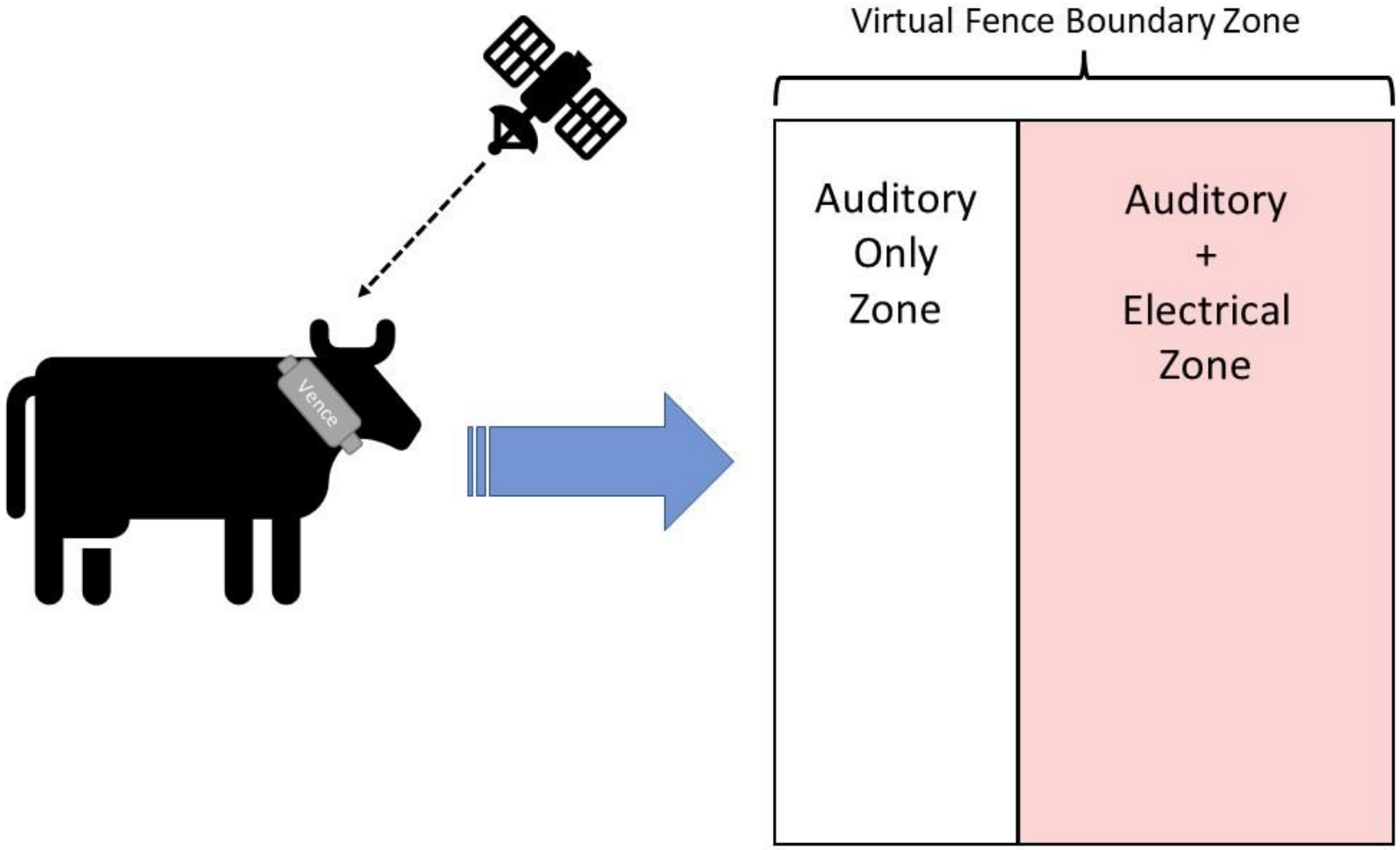
The collars uses the 2G and 4G networks to communicate with our app. In order create pastures, receive notifications etc, there must be cell phone coverage on pasture.

GPS-receiver

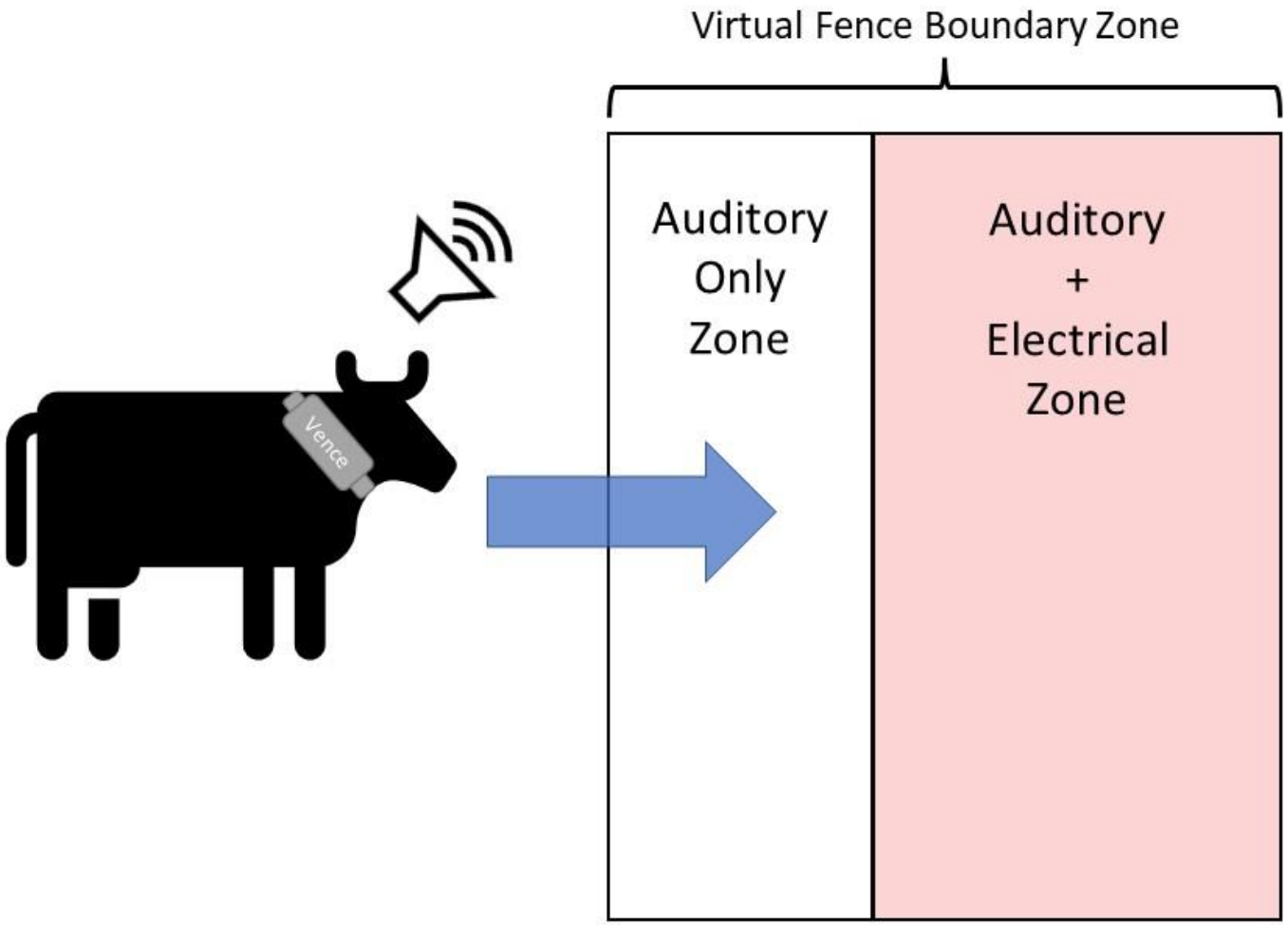
Nofence uses satellite signals from American GPS and Russian GLONASS to determine its position.

Corral

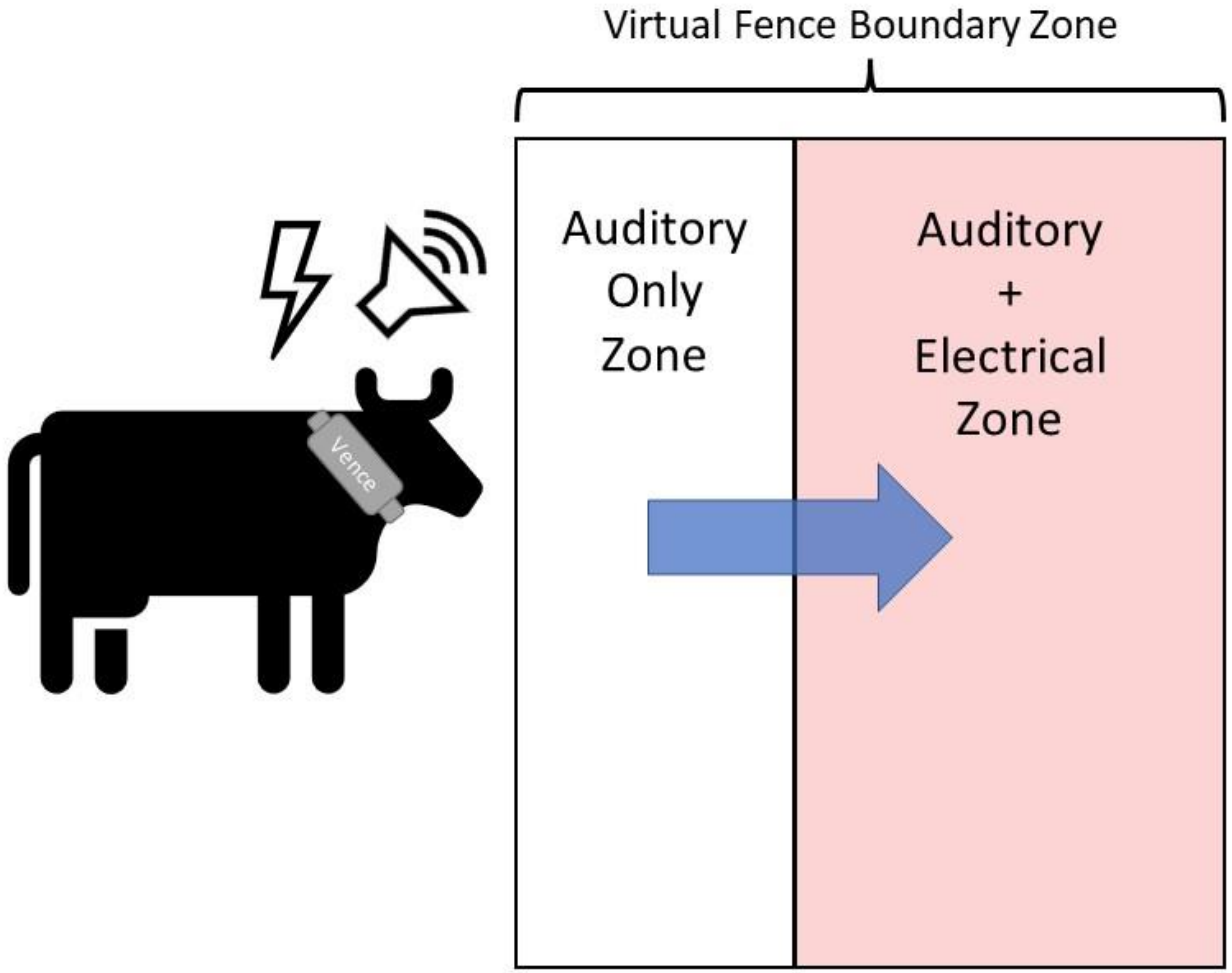
How Virtual Fences Work



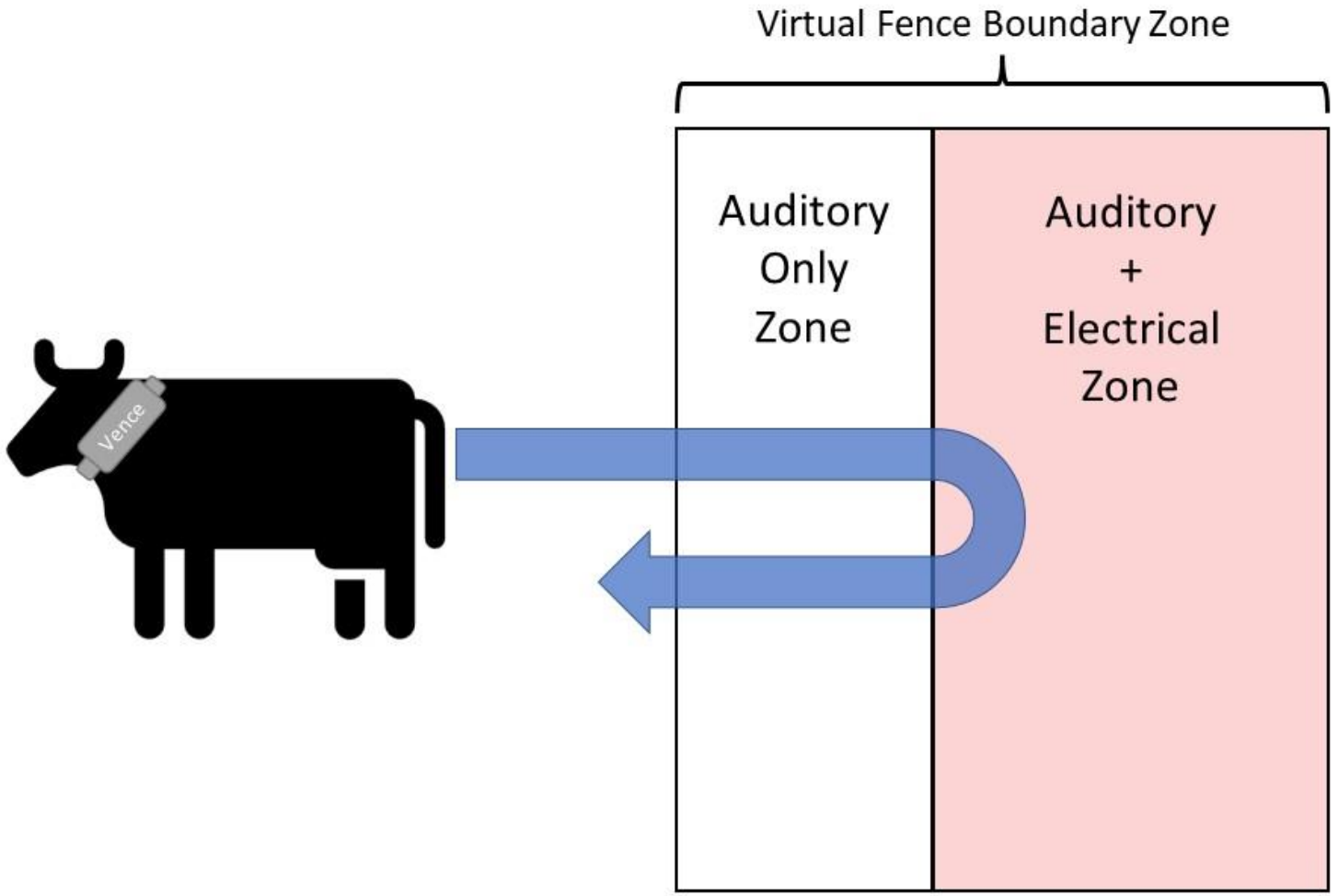
How Virtual Fences Work

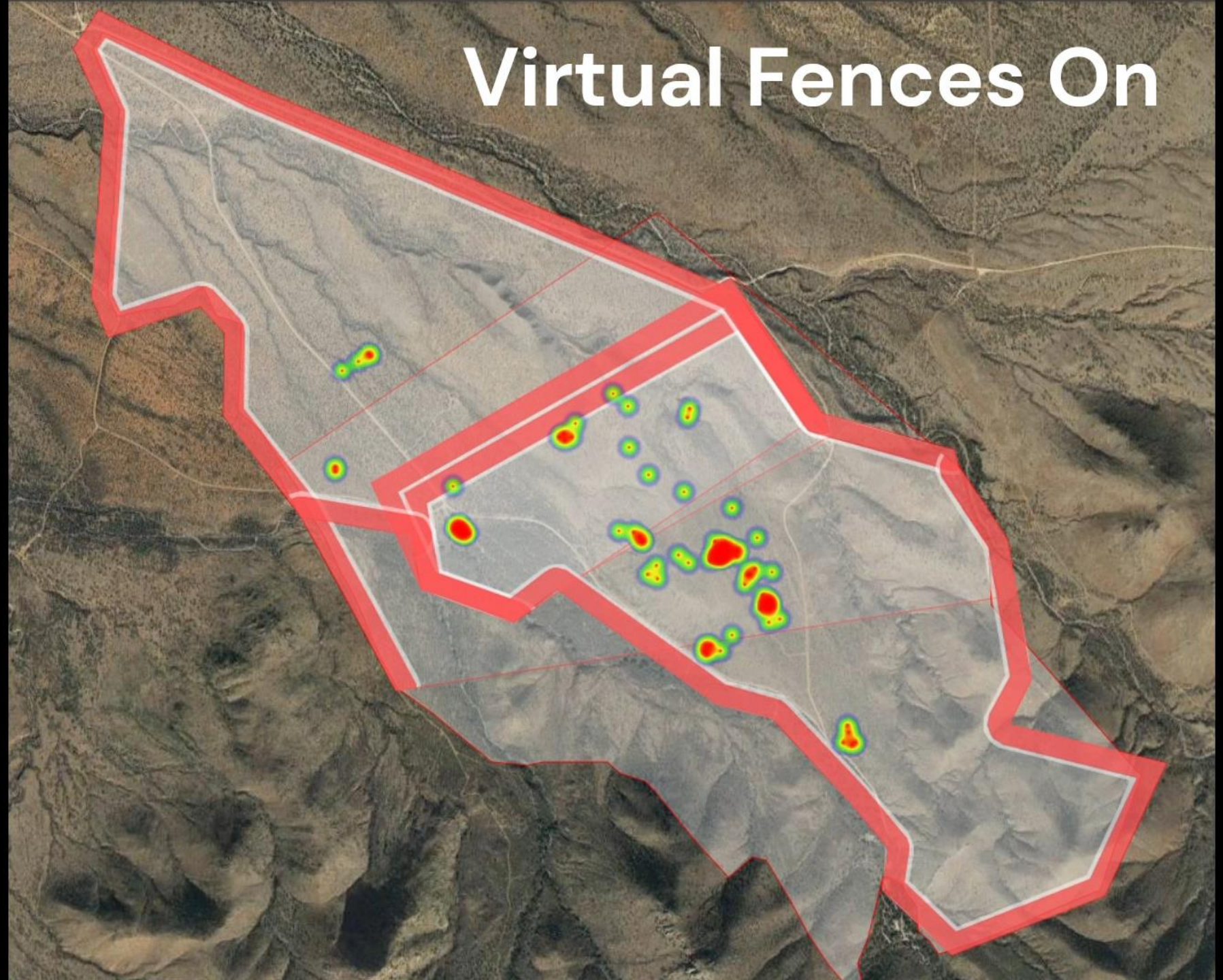


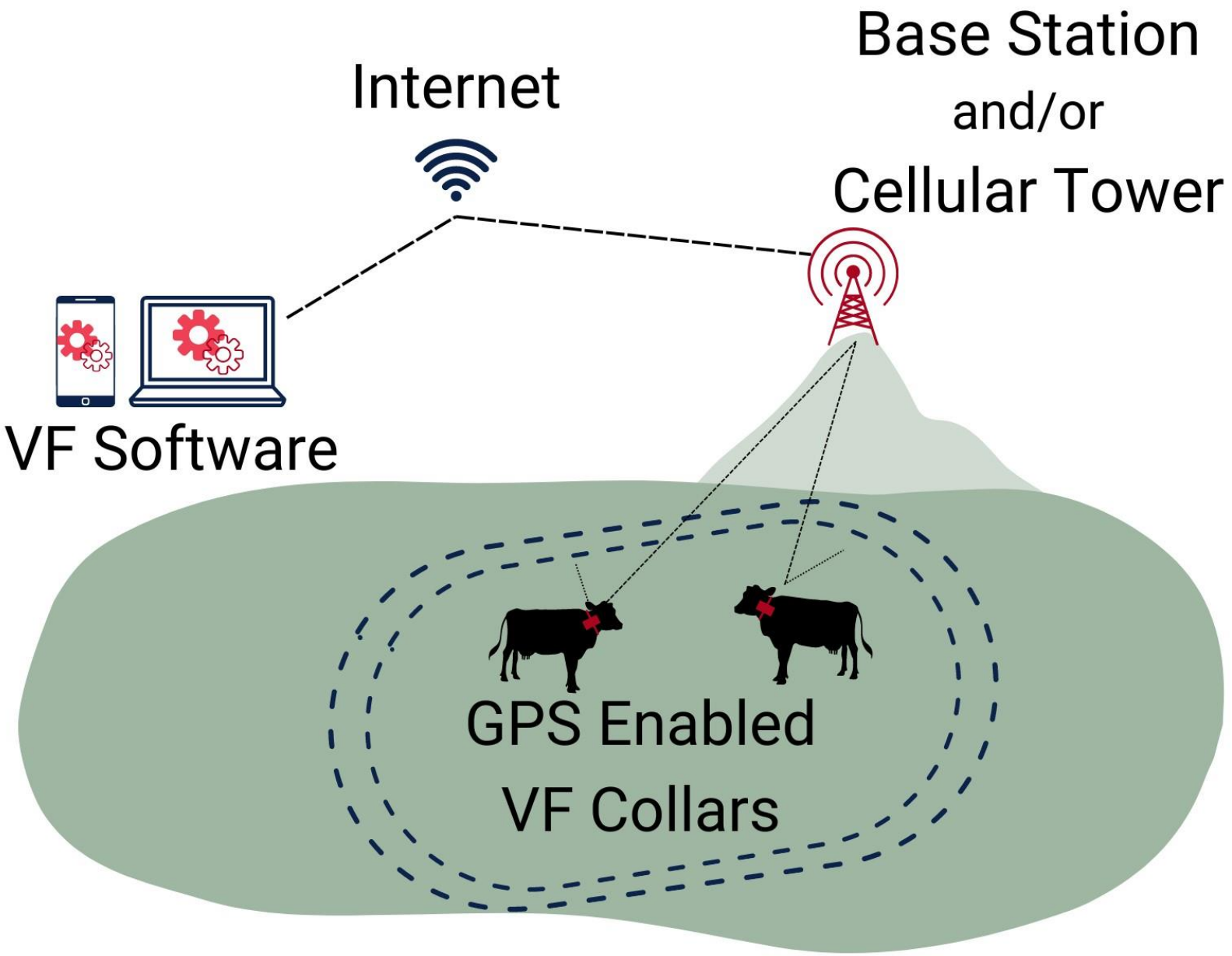
How Virtual Fences Work



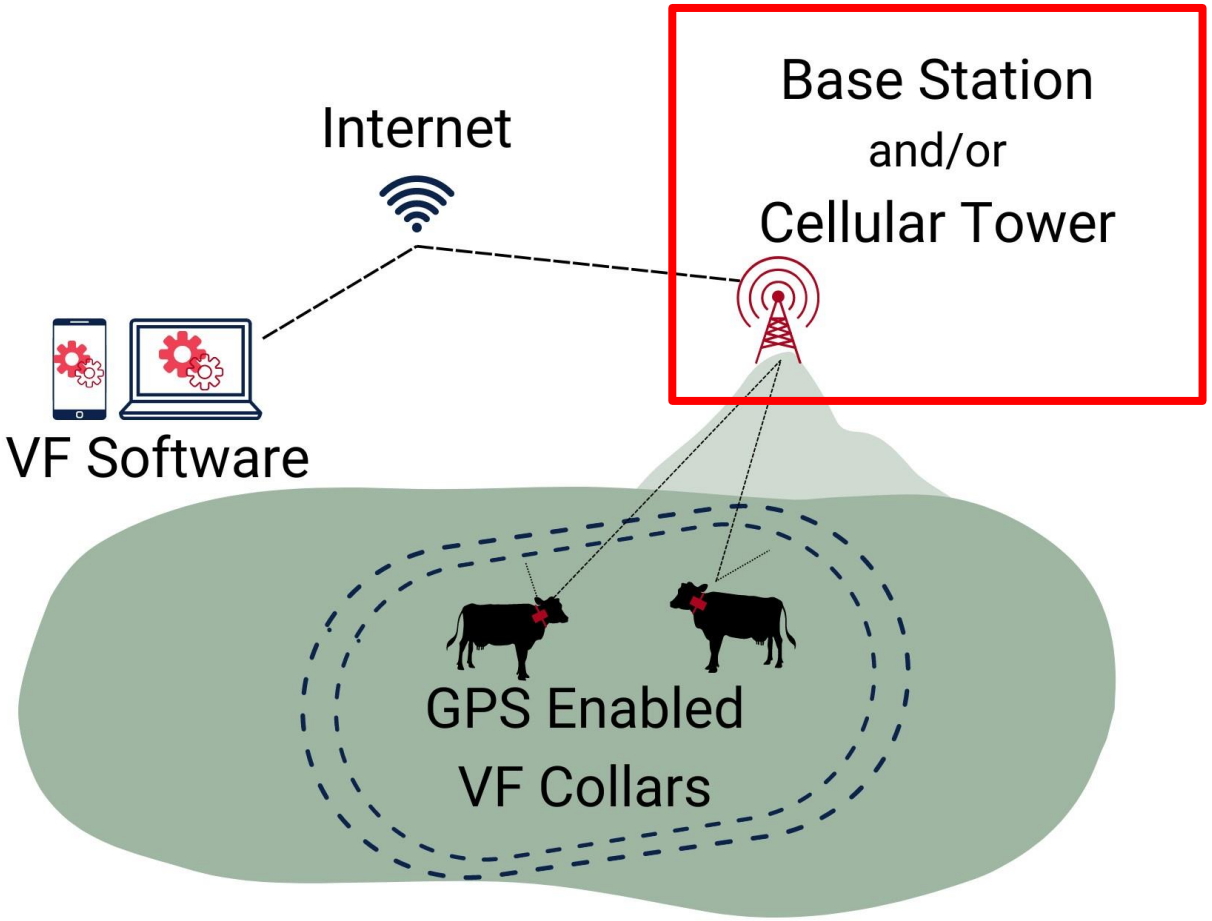
How Virtual Fences Work

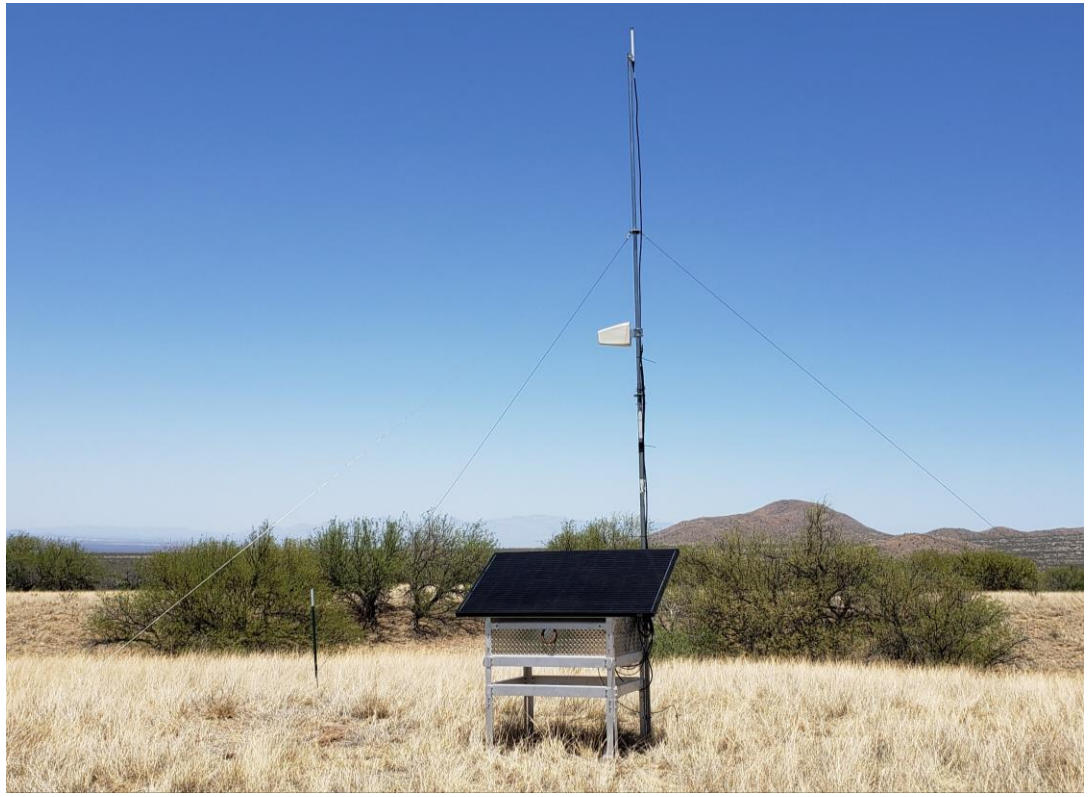



Virtual Fences On


Internet
Base Station
and/or
Cellular Tower
VF Software
GPS Enabled
VF Collars

Vence Radio Base Stations





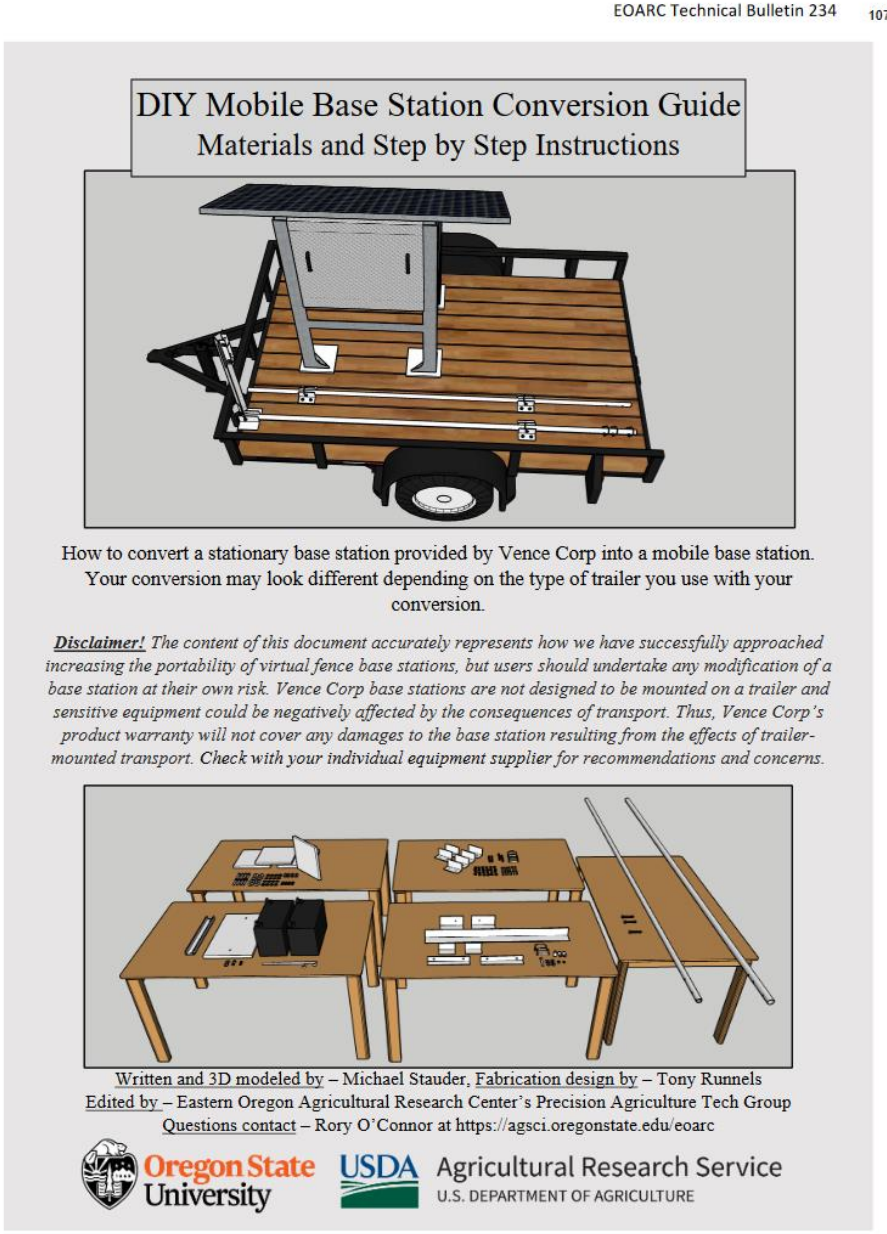
Mobile Base Station

Not officially supported by Vence Corp.

Move to new location as herd moves

Setup in < 1 hour

Saves $$$



EOARC Technical Bulletin 234 1075

DIY Mobile Base Station Conversion Guide
Materials and Step by Step Instructions

How to convert a stationary base station provided by Vence Corp into a mobile base station. Your conversion may look different depending on the type of trailer you use with your conversion.

Disclaimer! *The content of this document accurately represents how we have successfully approached increasing the portability of virtual fence base stations, but users should undertake any modification of a base station at their own risk. Vence Corp base stations are not designed to be mounted on a trailer and sensitive equipment could be negatively affected by the consequences of transport. Thus, Vence Corp's product warranty will not cover any damages to the base station resulting from the effects of trailer-mounted transport. Check with your individual equipment supplier for recommendations and concerns.*

Written and 3D modeled by – Michael Stauder, Fabrication design by – Tony Runnels
Edited by – Eastern Oregon Agricultural Research Center's Precision Agriculture Tech Group
Questions contact – Rory O'Connor at https://agsci.oregonstate.edu/eoarc

Oregon State University USDA Agricultural Research Service U.S. DEPARTMENT OF AGRICULTURE

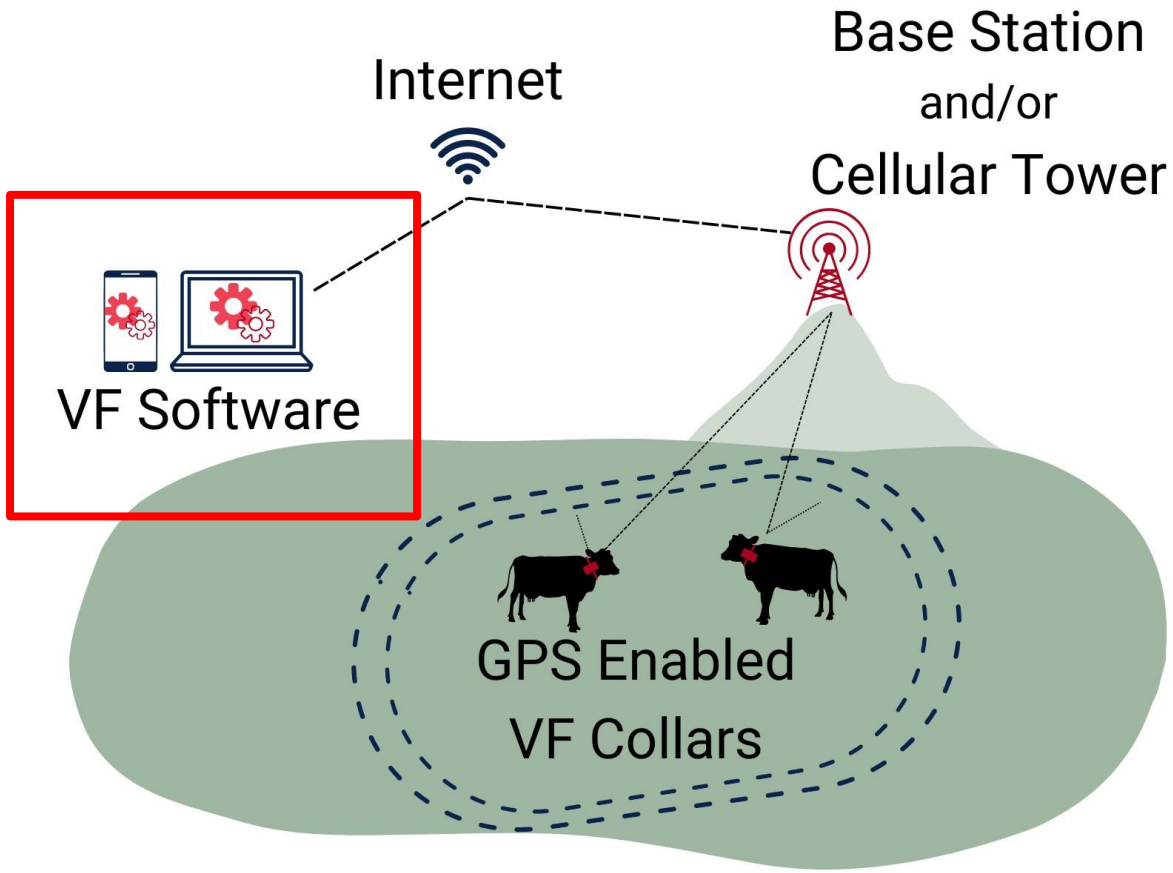
Step-by-Step Instructions on How to Assemble Your Own Mobile Base Station

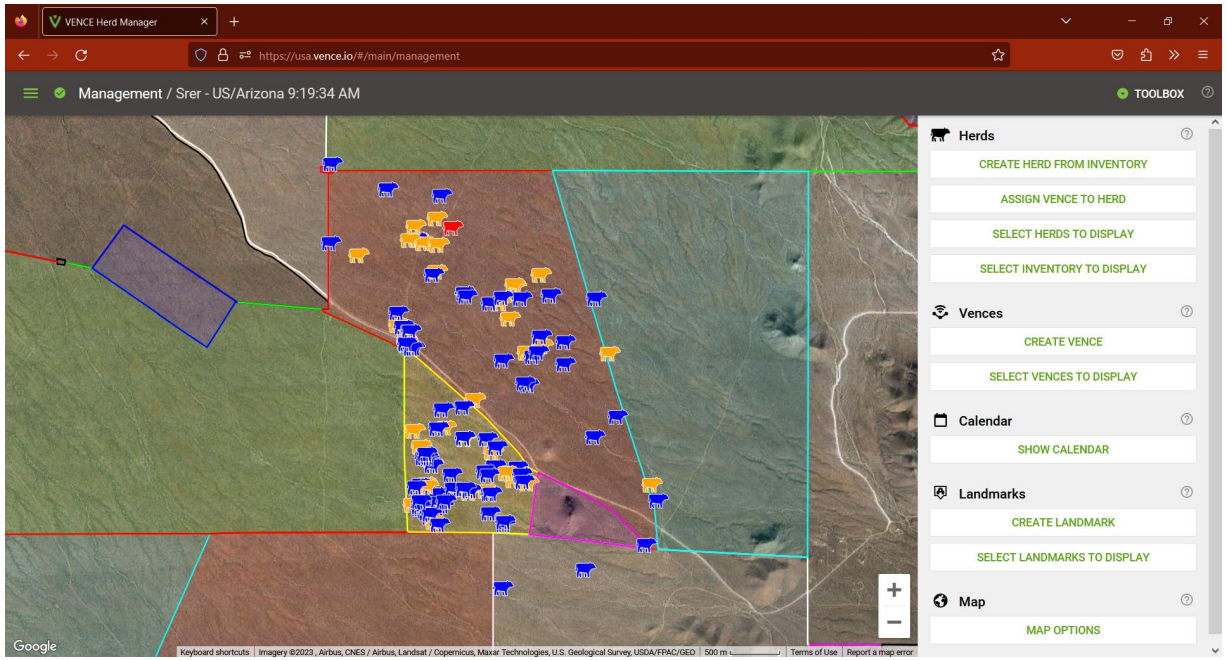
Link: https://agsci.oregonstate.edu/biblio/diy-mobile-base-station-conversion-guide-0

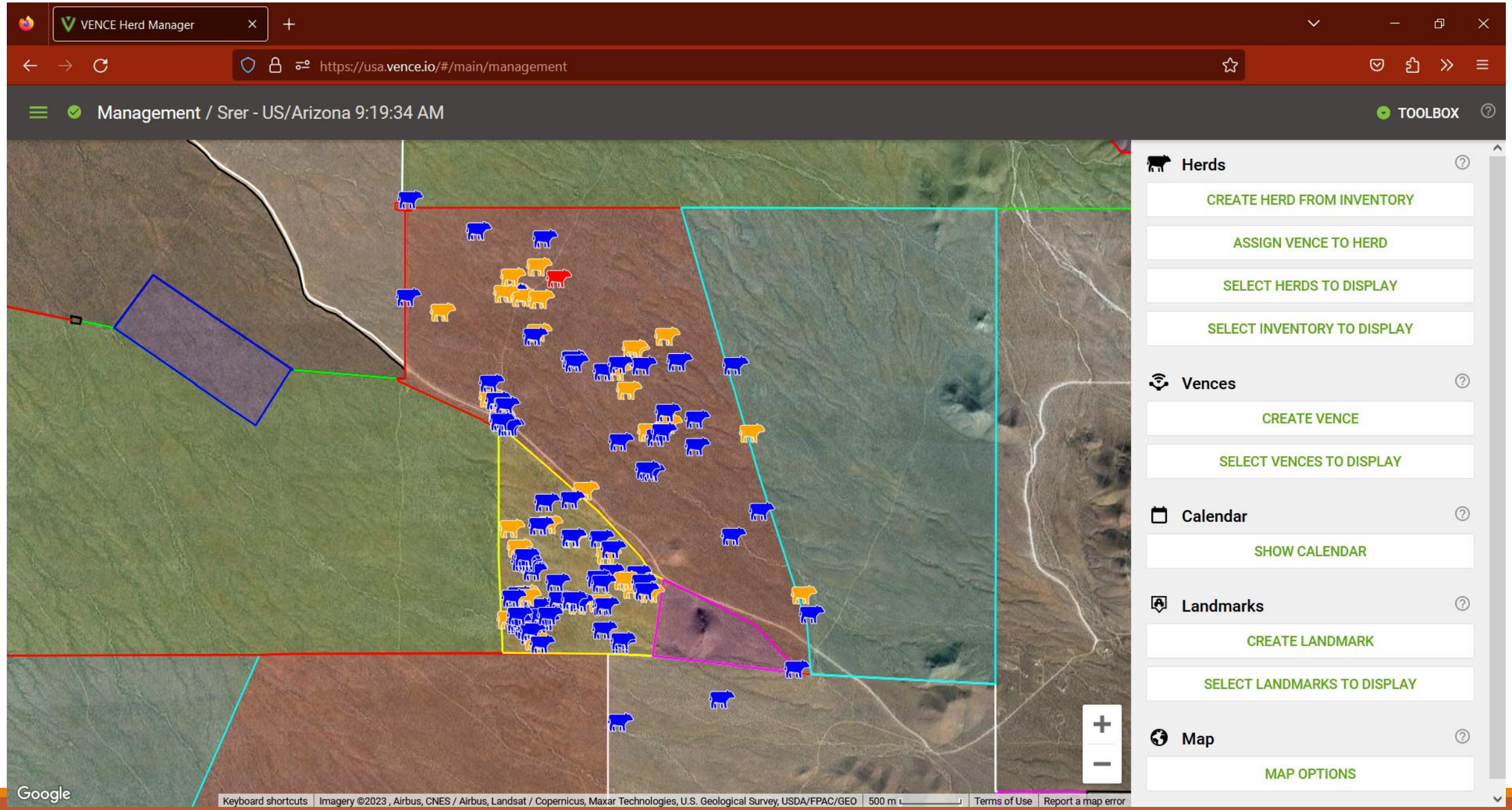
All resources will be linked here:

https://rangelandsgateway.org/virtual-fence

Software Interface - HerdManager






VENCE Herd Manager
https://usa.vence.io/#/main/management
Management / Srer - US/Arizona 9:19:34 AM
TOOLBOX
Herds
CREATE HERD FROM INVENTORY
ASSIGN VENCE TO HERD
SELECT HERDS TO DISPLAY
SELECT INVENTORY TO DISPLAY
Vences
CREATE VENCE
SELECT VENCES TO DISPLAY
Calendar
SHOW CALENDAR
Landmarks
CREATE LANDMARK
SELECT LANDMARKS TO DISPLAY
Map
MAP OPTIONS
Google
Keyboard shortcuts
Imagery ©2023 , Airbus, CNES / Airbus, Landsat / Copernicus, Maxar Technologies, U.S. Geological Survey, USDA/FPAC/GEO
500 m
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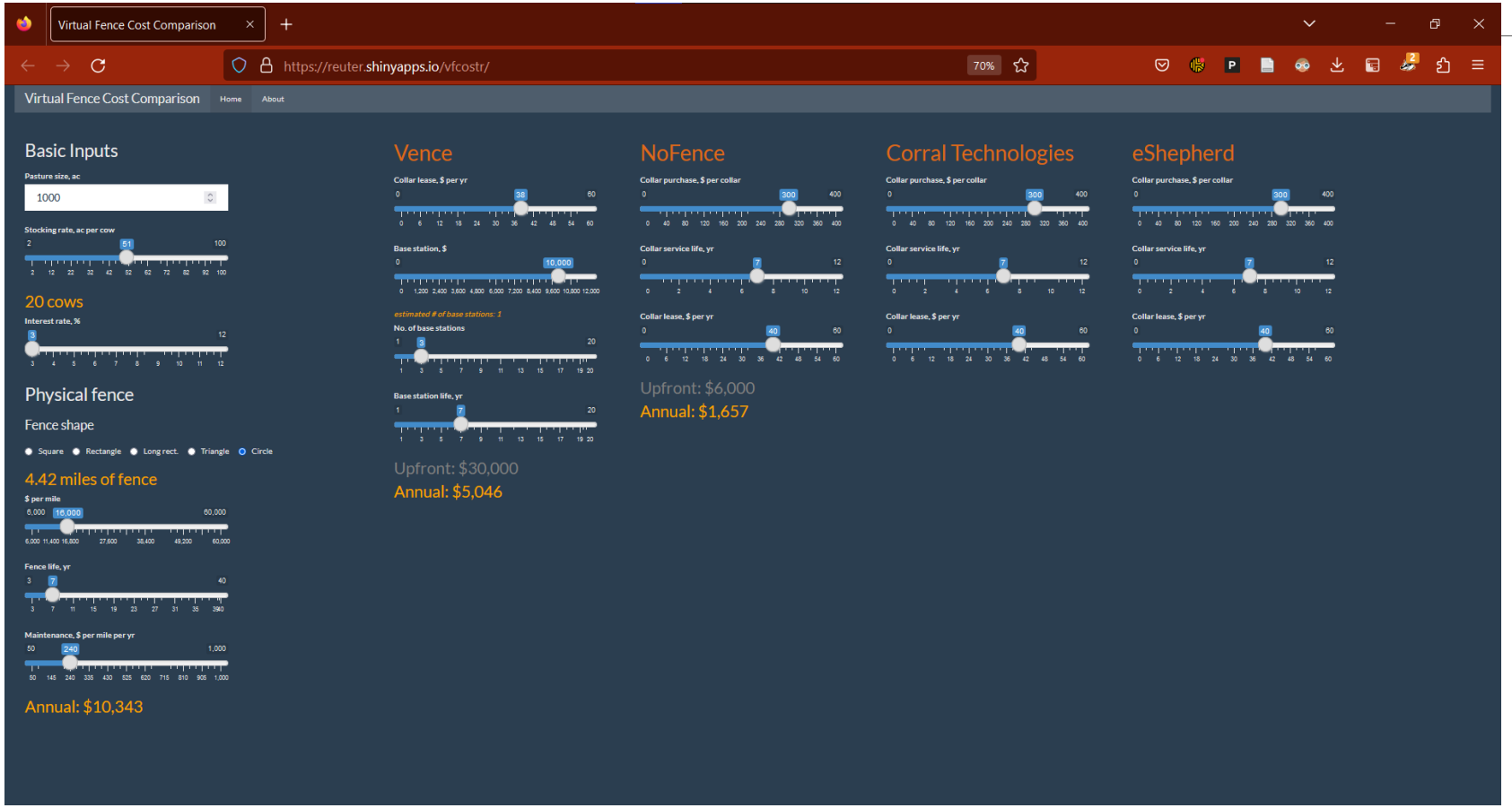
Report a map error

Cost Comparison Tool



Currently in Beta Testing

Ryan Reuter – Oklahoma State University

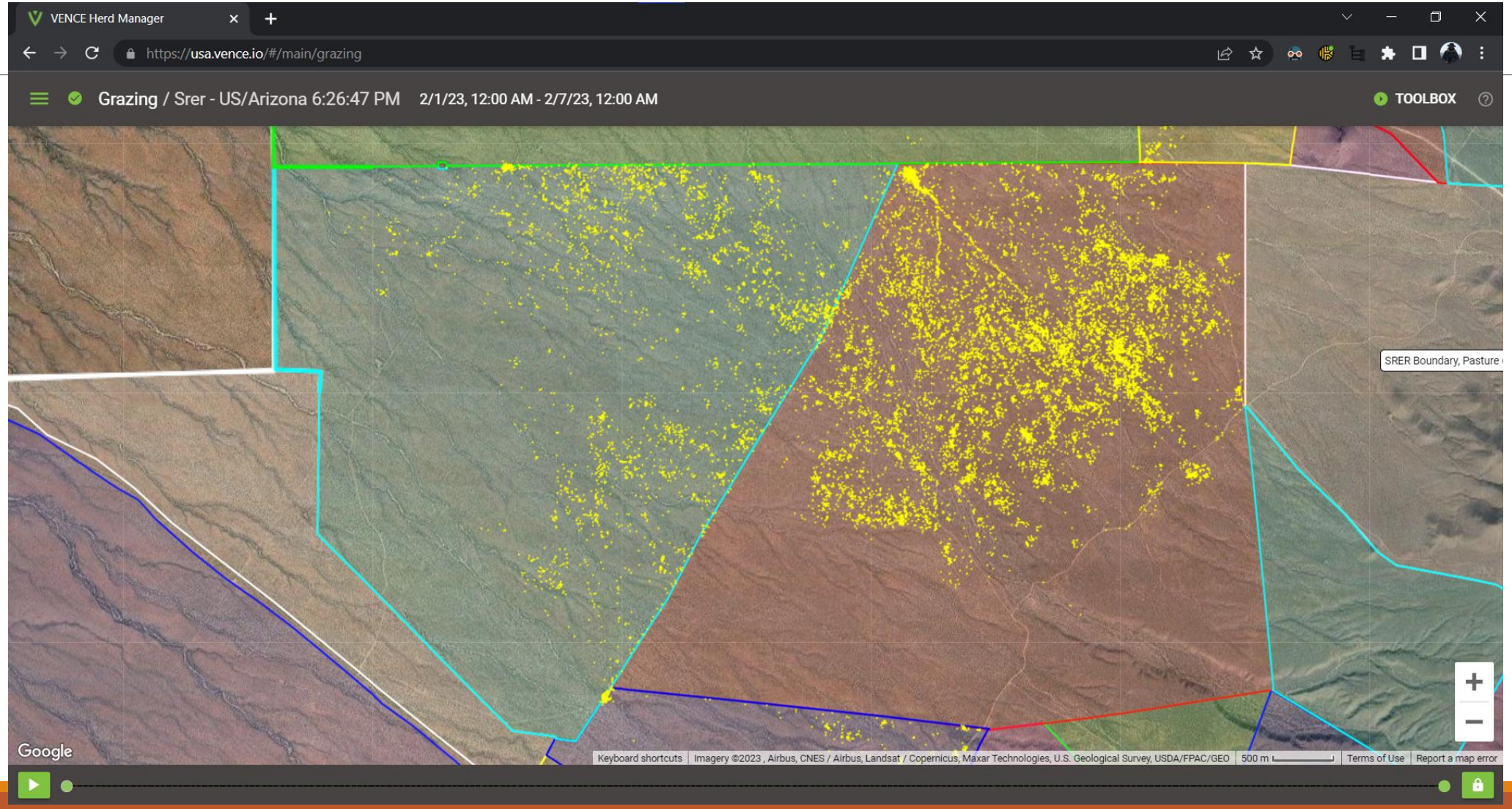
https://reuter.shinyapps.io/vfcostr/

Key Questions to Consider

1. How many collars?
2. Where and when can you collar?
3. How many base stations?
4. Where to place base stations?

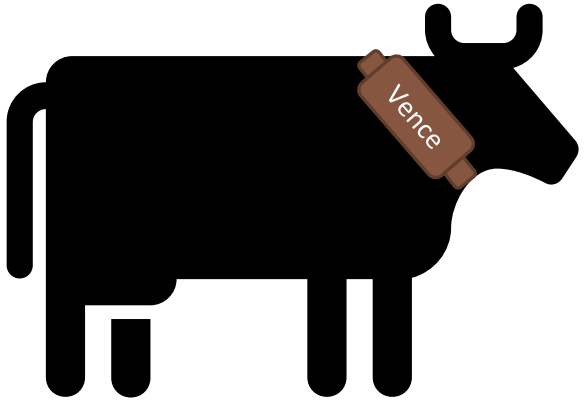
Potential Applications

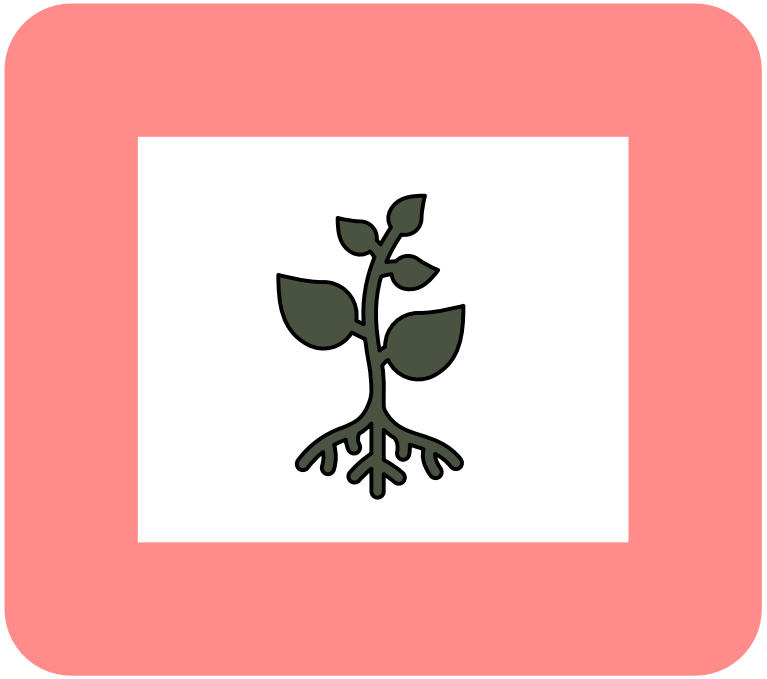
1. Improve Grazing Distribution



2. Fence Areas with Minimum Cost and Maximum Flexibility

- avoid toxic/noxious weeds



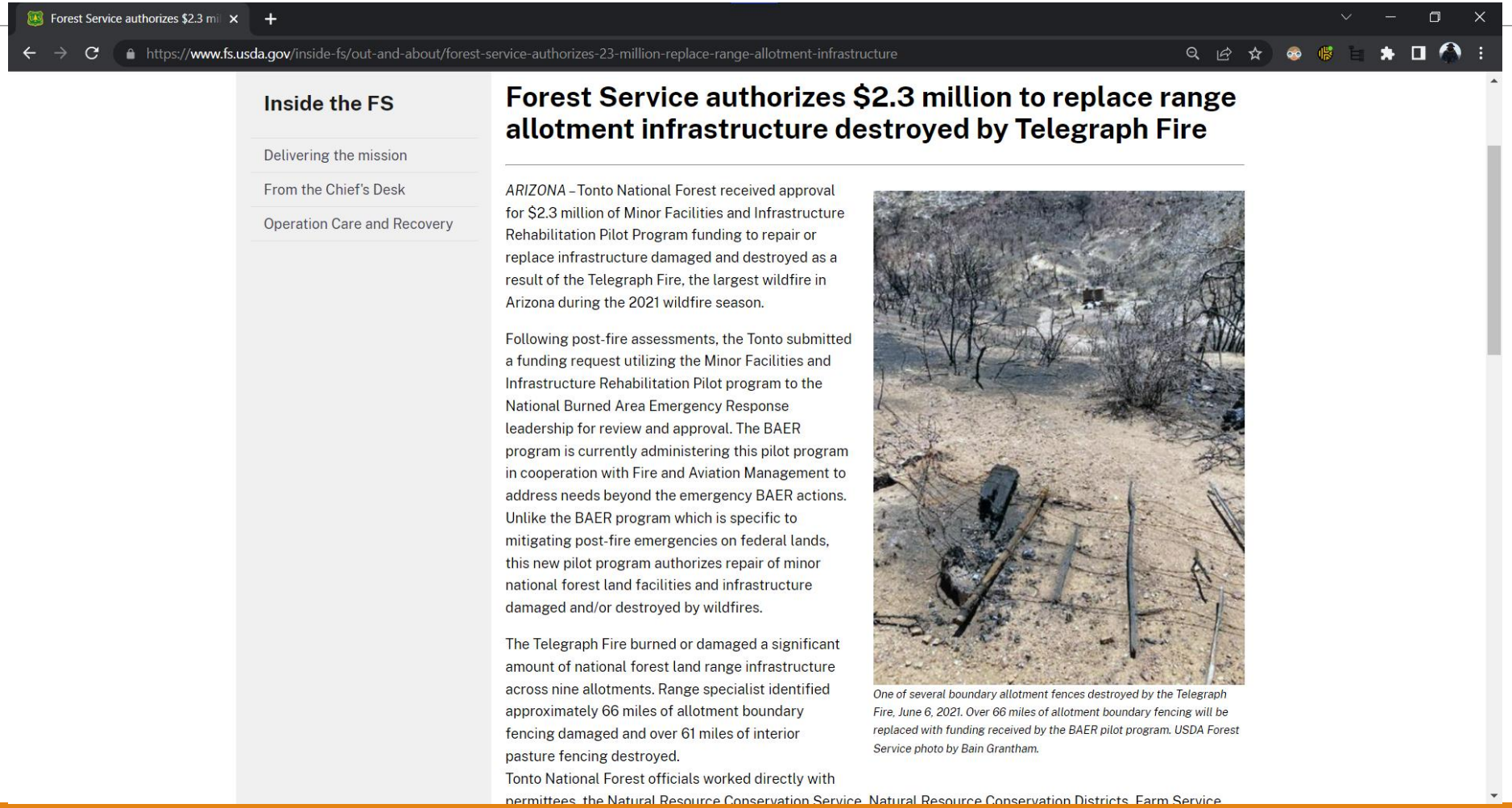


3. Post-Fire or Disturbance

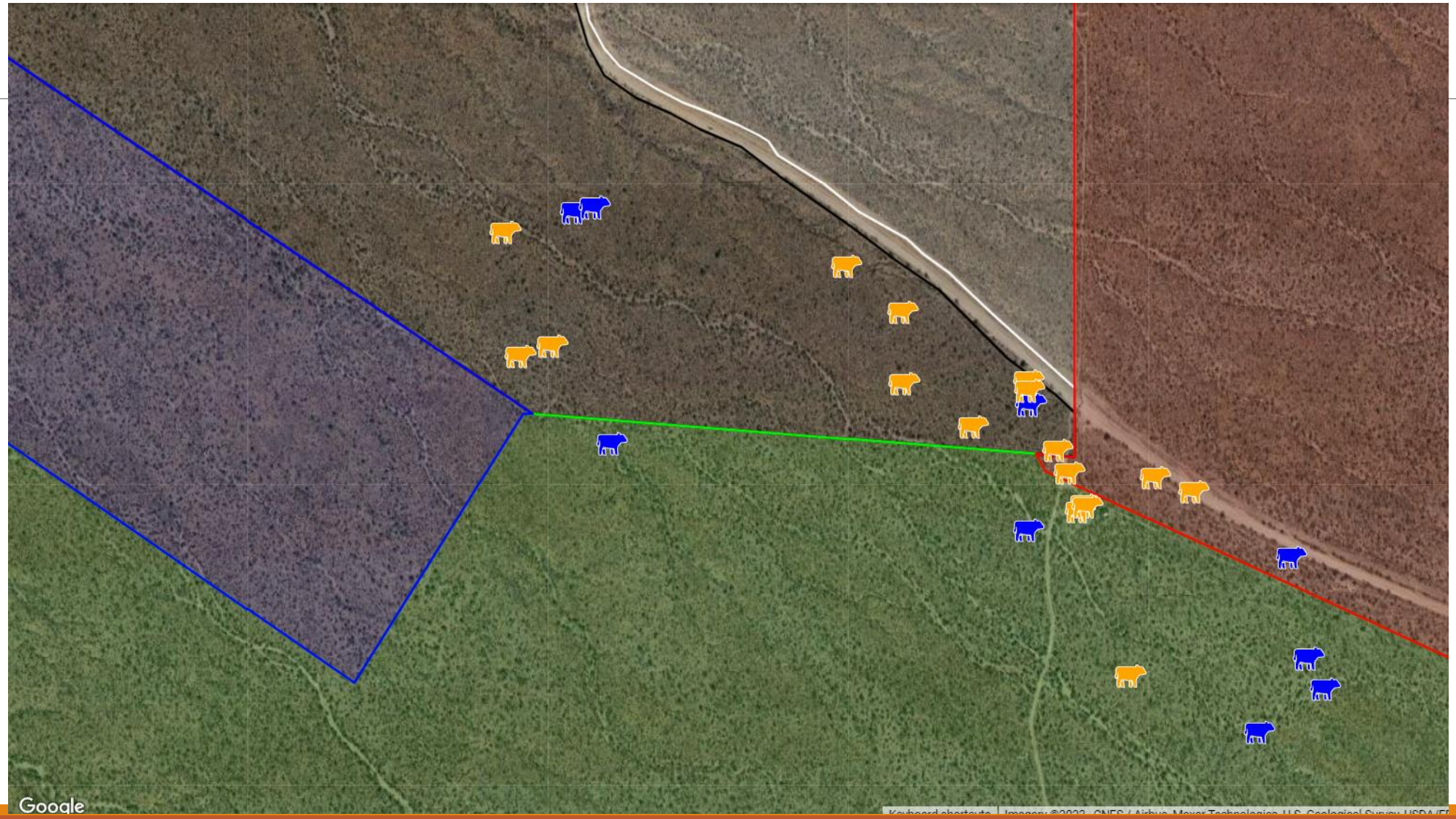
- partially burned allotments – let the burned area recover and graze the un-burned area

4. Supplement Existing Fences

- buys you time to make repairs



5. Easier to Locate and Gather Cattle!



6. Riparian Exclusion

Image Credit: https://www.gettingmoreontheground.com/2019/06/09/livestock-exclusion-is-it-time-for-the-big-r/

The University of Arizona

Virtual Fence Program

Supported by

THE UNIVERSITY OF ARIZONA Cooperative Extension
Livestock Extension

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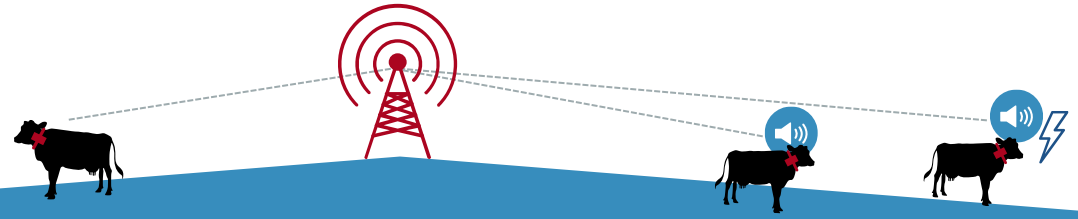

rangelandsgateway.org/virtual-fence