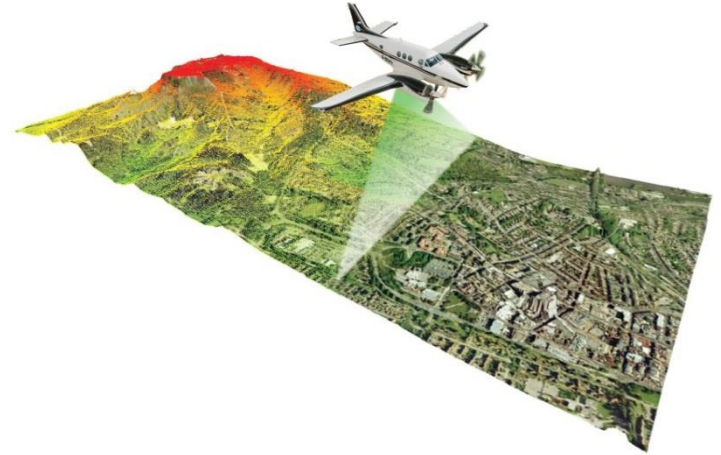


Chapter 2: Some ROW Collaborative History



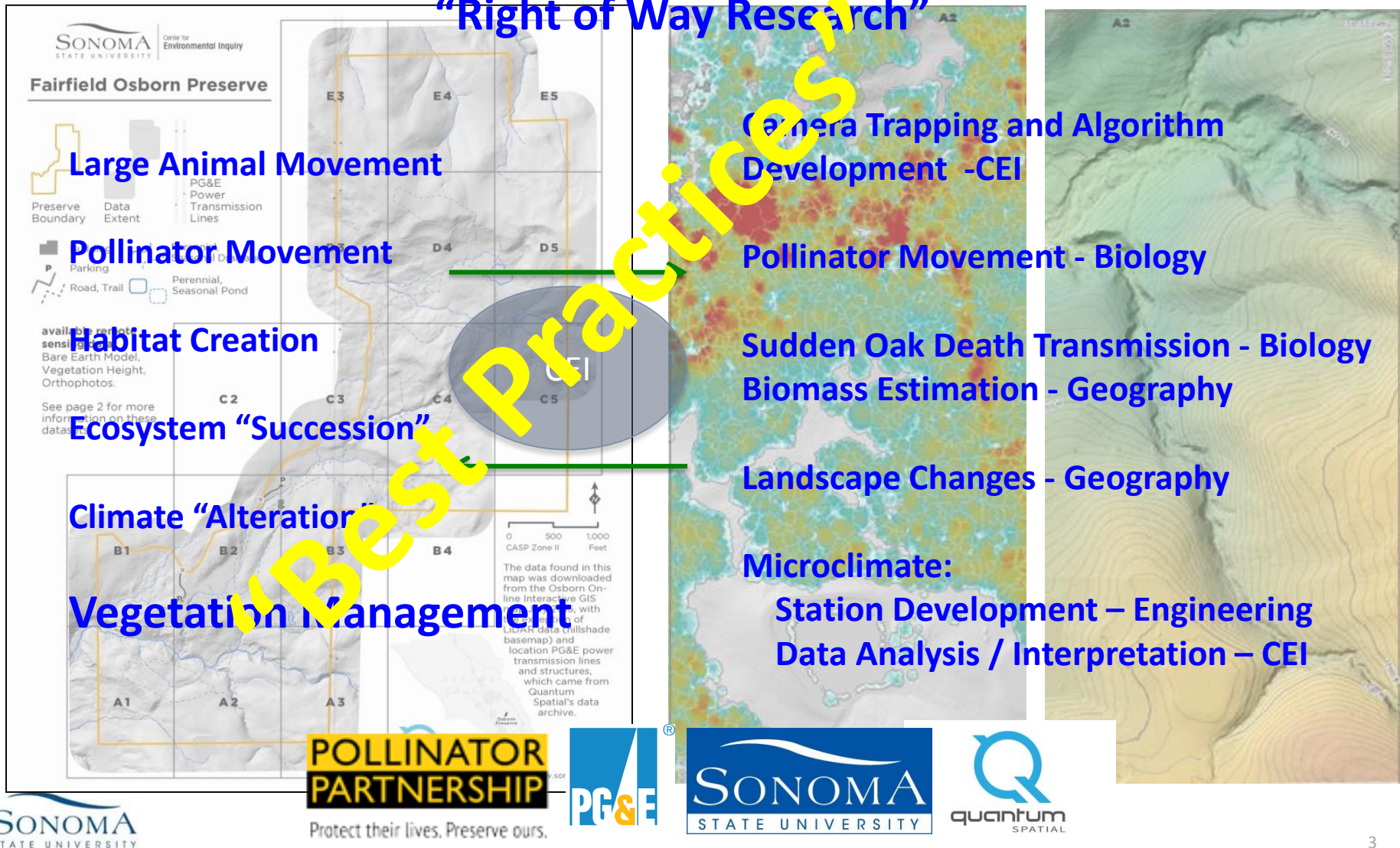
Target PG&E Goals

- Leverage Innovation and Forward-thinking Technology (LIFT)
- Integrated Vegetation Management (IVM)
- Community Investment
- Partnerships



ROW Research To Date– Two Way Communication, Stewardship, and Technology Development

“Right of Way Research”





Nature!Tech

How innovating with technology targets PG&E goals

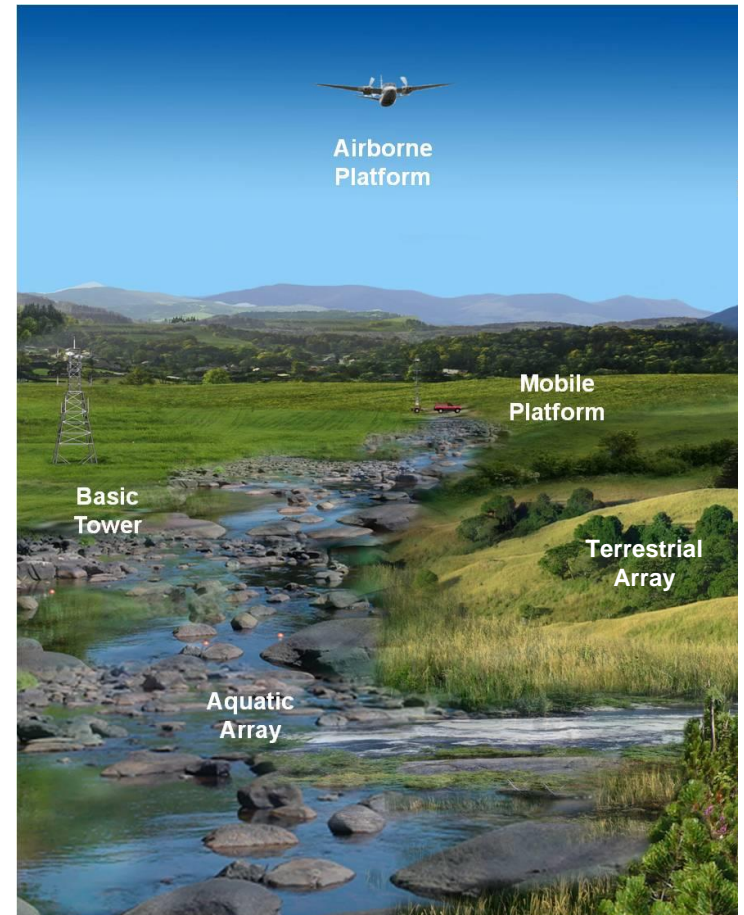
1. Leverage innovation and forward-thinking technology (LIFT)
2. Inform best management practices for IVM
3. Train the next generation of professionals
4. Leverage existing research



Leverage Innovation and Forward-Thinking Technology

Nature!Tech Observation Network

- Remote imagery (LiDAR, Hyperspectral, etc.)
- Ground-based sensors
- Environmental monitoring plots



How Does Vegetation Respond to IVM Over Time?

Challenge

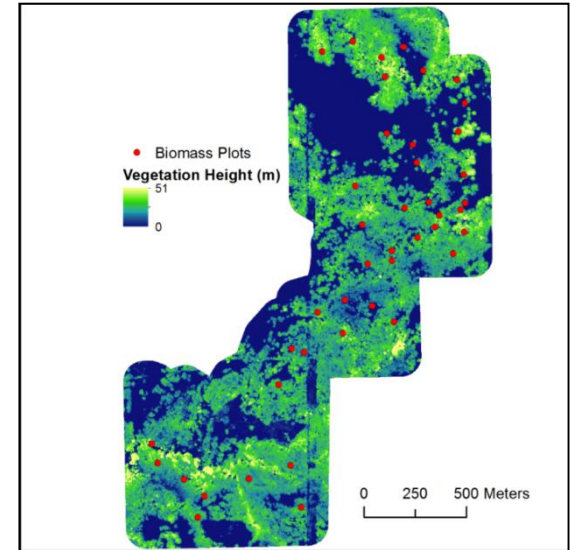
- Poor LiDAR estimates of biomass in California woodlands

New Technology

- LiDAR tools for estimating vegetation biomass

IVM and Community Benefits

- Long-term remote monitoring of stable low-growing vegetation
- Regional estimates for carbon trading



Clark, M. (2016). Remote Sensing for Forest Monitoring, *Fire Mitigation and Forest Health Workshop Proceedings*, May 20, 2016, Pepperwood Preserve, Santa Rosa, California.

Romero, M. & Clark, M. (2016). Assessing LiDAR efficiency for estimating aboveground biomass in an open-canopy mixed forest, *J. Remote Sensing*, in preparation.

How Do Mammals Respond to IVM?

Challenge

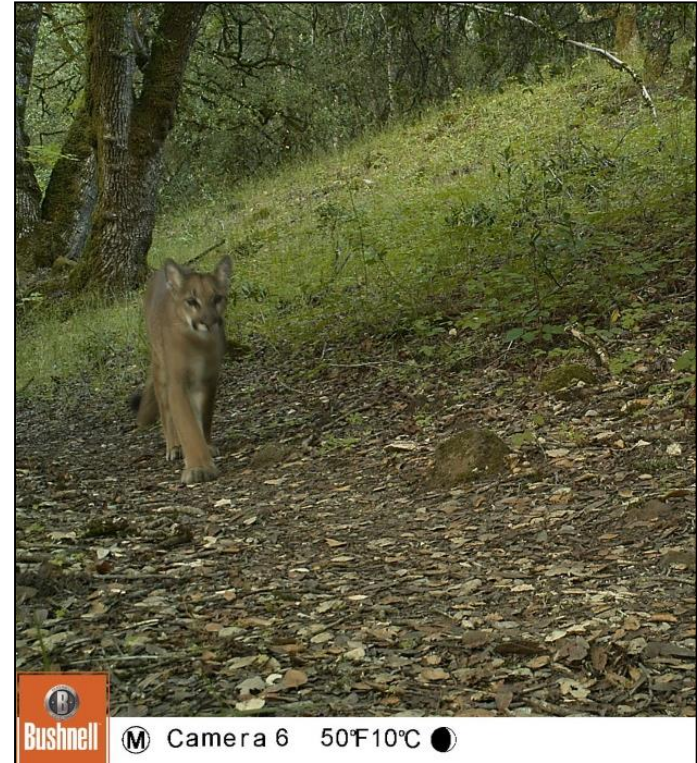
- Analysis time for monitoring wildlife with cameras

New Technology

- Automated image recognition software

IVM and Community Benefits

- Update BMPs for enhancing diversity
- Use utility corridors to enhance regional habitat connections



Diaz, R., and C. Halle (2015). *Free Background Checks!: Automated Wildlife Image Processing at the Fairfield Osborn Preserve*, presentation at the Sonoma State University Science Symposium

Zhong, J., and C. Halle (2015). *Object Detection by Using Matlab*, presentation at Sonoma State University .

How Do Pollinators Respond to IVM?

Challenge

- Pollinator declines and effects on agriculture and natural systems

New Technology

- Relating remote sensing to plant and insect diversity

IVM and Community Benefits

- Updated BMPs for enhancing diversity
- Management to enhance regional agriculture and natural systems

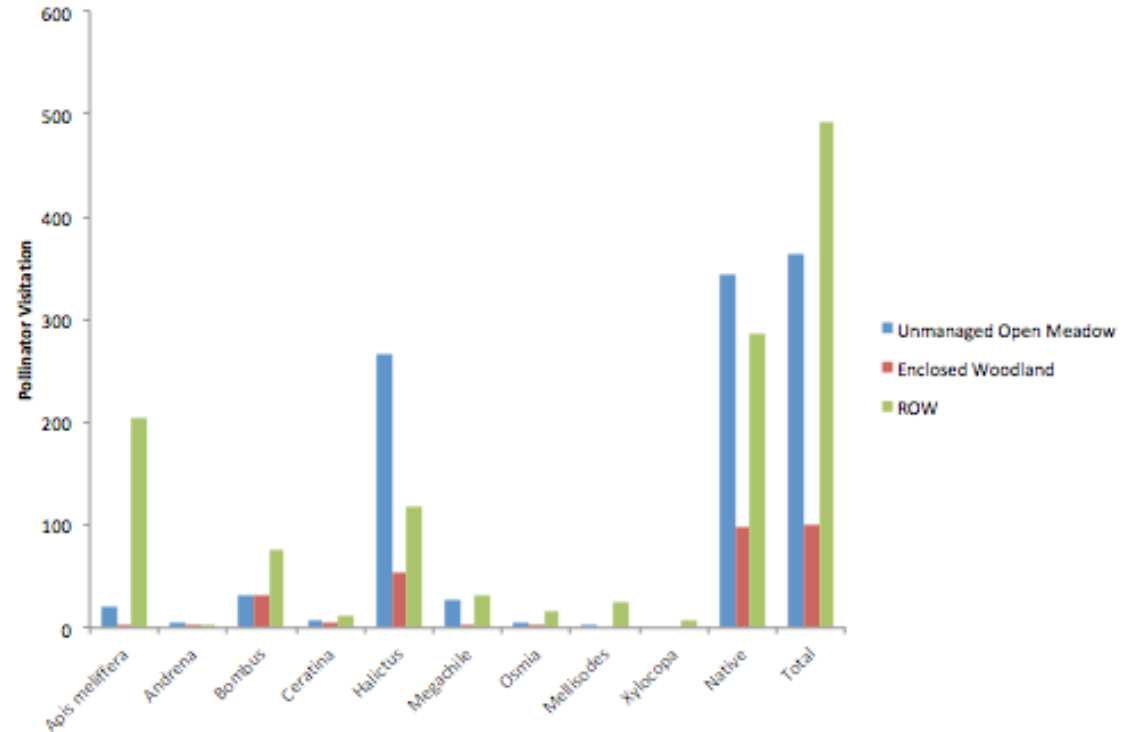


Native bees are more abundant after IVM

Pollinator Response at FOP

Three Year Trends

Bee Visitation, Fairfield
Osborn Preserve, 2014-
2017



The managed ROW was visited more often by bees (including honeybees) than either the open unmanaged meadow or the enclosed oak woodland. The open meadow was visited more often by native bees. (Different than other sites!)

How can IVM diversify climate and habitat for species?

Challenge

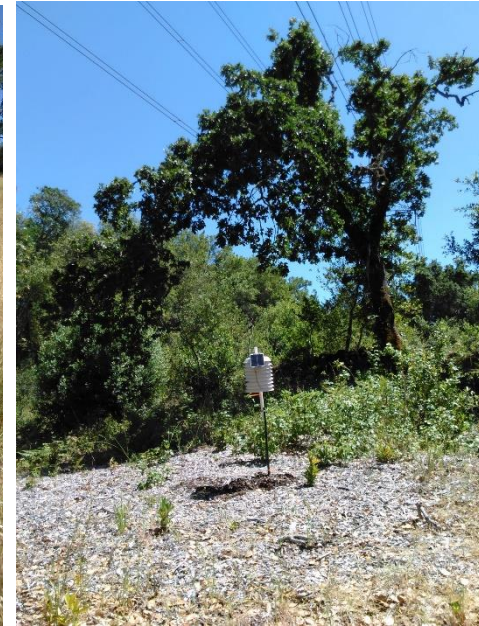
- Changes in species diversity with climate and ROW

New Technology

- Low-cost microclimate sensors

IVM and Community Benefits

- Updated BMPs for enhancing diversity
- Wine industry and agricultural applications



McGuire, J. (2016a). *A distributed wireless sensor network for environmental monitoring*, Master's Thesis, Sonoma State University.

McGuire, J. (2016b). *PIC18F Library for Dallas One Wire.*, <http://github.com/jrmcguire/DS18B20>. [Online; Accessed 12 Oct 2016].

McGuire, J., and F. Farahmand (2016). Techniques in Data Visualization for Electrical Engineering: From Embedded Systems to the Internet, *American Society for Engineering Education Conference Proceedings*, <http://www.asee.org/public/conferences/64/papers/14531/view>.

How can IVM affect spread of disease?

Challenge

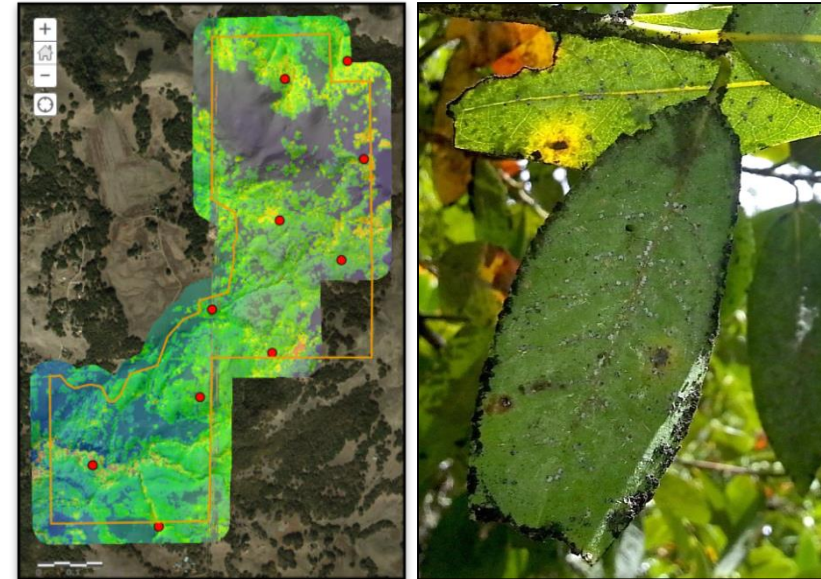
- Sudden Oak Death, fuel loading, woodland change

New Technology

- Microclimate sensors

IVM and Community Benefits

- Updated BMPs for preventing SOD spread
- Disease control in natural systems



SOD transmission declines in sunny ROWs

Wininger, K. (2016). *Effects of insect herbivory on susceptibility of bay laurel to the pathogen that causes Sudden Oak Death*, Master's Degree Research Proposal, Sonoma State University.

Wininger, K., and N. Rank (2015). *This tree's not big enough for the both of us: Symptom's of Sudden Oak Death on California Bay Laurel are lower when insect herbivores are abundant*, poster presentation at the Northern California Botanists Symposium.

N!Tech Conference



US Geological Survey

AeroTestra

Sonoma County Water Agency

Rainforest Connection

Biomimicry Institute

Bird's Eye View

Pepperwood Preserve

Modini Mayacamas Preserves

Quantum Spatial Inc

City of Rohnert Park

SSU Faculty

.... And more