



Webinar

National Association of Marine Laboratories (NAMML)

“The Virtual Field: Expanding Field Station and Marine Laboratory Educational Programs with Virtual Experiences”

- Sponsored by the NAMML Education Committee
- May 7, 2021
- Speaker: Claudia Luke, Sonoma State University
- [Link to recording](#)



The Virtual Field

Dr. Claudia Luke

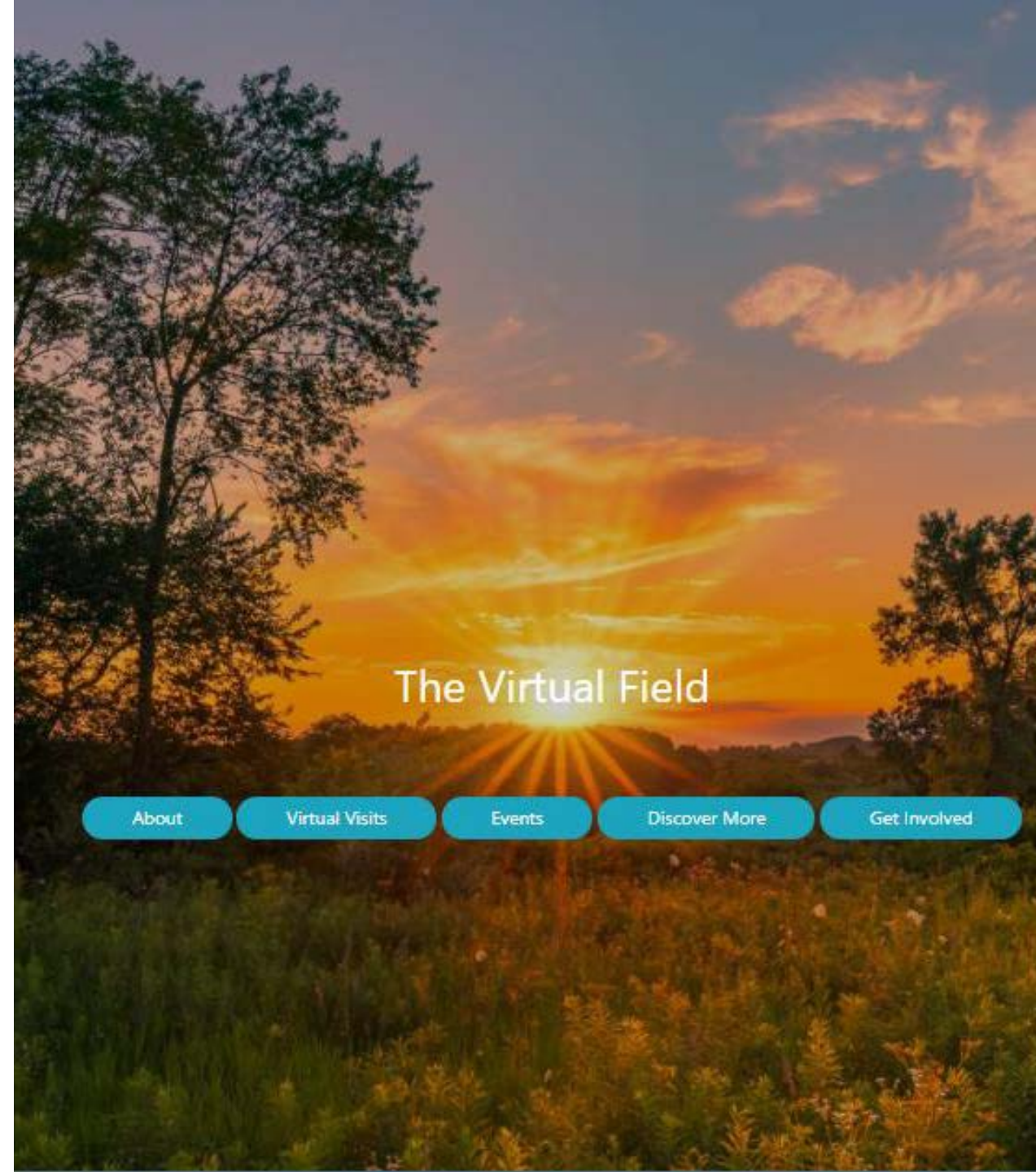
Dr. Sarah Oktay, UC Davis

Dr. Hilary Swain, Archbold Biological Station

Dr. Kari O'Connell, Oregon State University

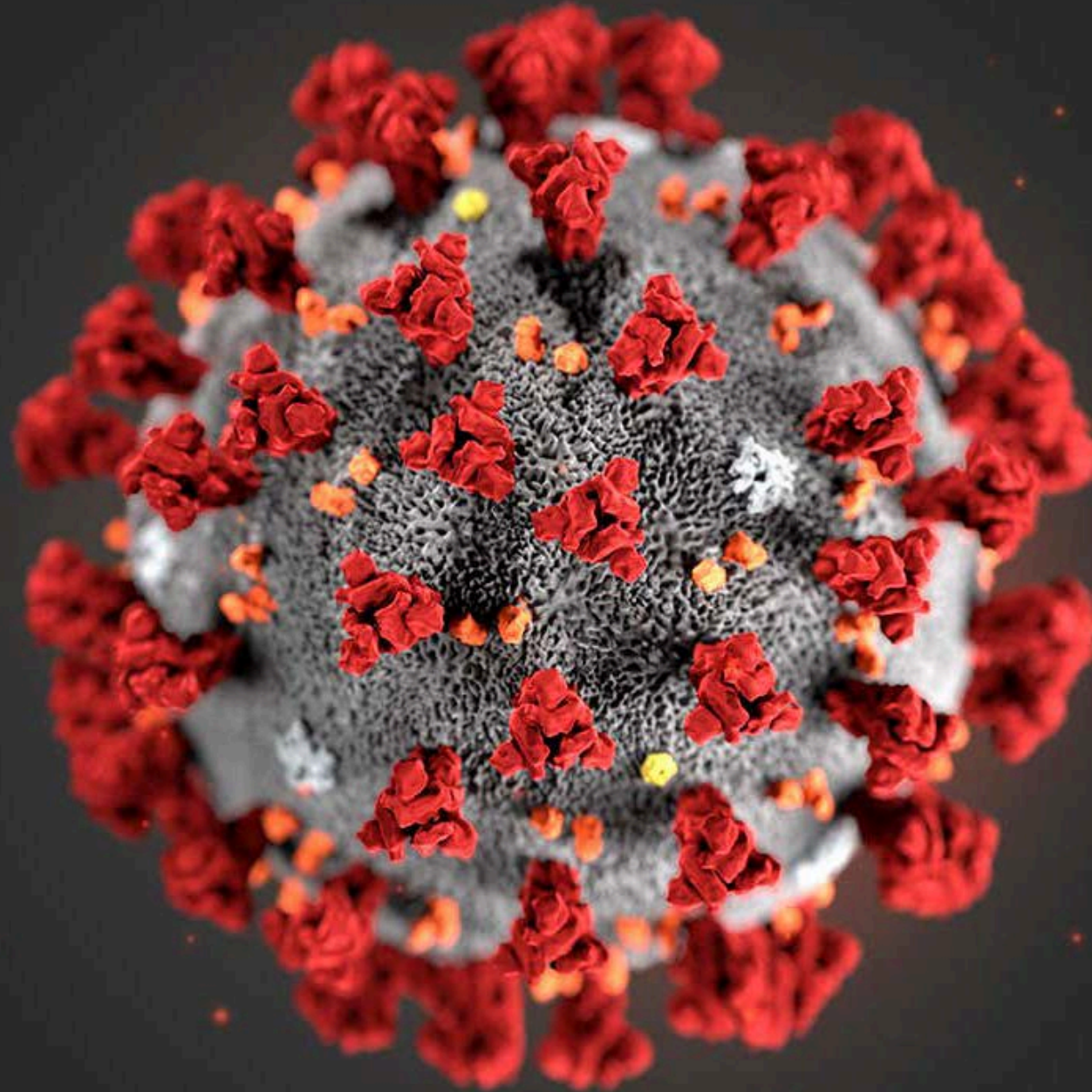
The Virtual Field

- ▶ Background & Opportunities
- ▶ Products
- ▶ Outcomes
- ▶ Next Steps



Background

- ▶ 500,000 to 1 million students for 1-2 years
- ▶ Loss of field experiences: hands-on skills, motivation, retention, critical thinking and academic success
- ▶ All disciplines esp. STEM
- ▶ Loss of recruitment into research



Background

- Mar 16: University COVID-19 closures
- Mar 25: Pitched idea to OBFS listserv
- Mar 31: First weekly meeting: 42 field sites
- Apr 29: NSF RAPID grant application submitted (PI: Claudia Luke, Co-Pis: Hilary Swain, Kari O'Connell)
- May 6: NSF RAPID grant awarded

The Virtual Field First Year Scramble

1. Create cross-site experiences
2. Advertise and distribute virtual experiences to U.S. universities
3. Evaluate efficacy of efforts and set the stage for further initiatives



Opportunity

“At this moment in time, we are called to lead and act with courage. We are called to embrace change. Change in our societies. Change in the management of our economies. Change in our relationship with our one and only planet.”

United Nations 2014, p. 3





Products



Recreate FSML Learning Experiences

Align with exceptional learning at FSMLs:
Undergraduate Field Experiences
Network (UFERN) - Delphi Study

- ▶ First-Hand and Outdoor
- ▶ Skills-Based: Observation, Communication, Critical Thinking
- ▶ Social



Create New FSML Experiences

- ▶ Cross-site comparisons
- ▶ Without barriers to participation



Products

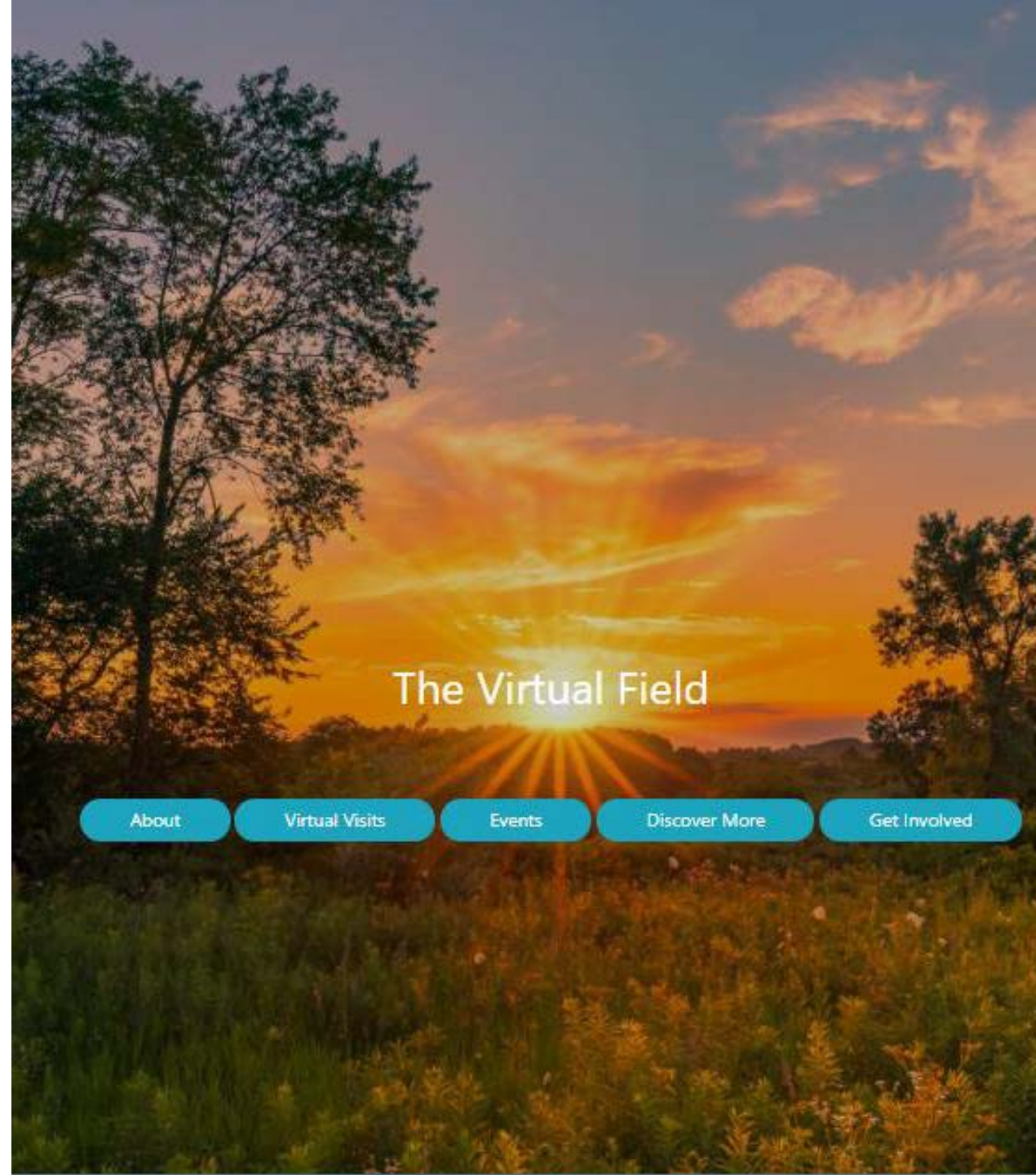
1. Web Portal
2. Ecosystem Exploration Videos
3. Live from the Field Events
4. Share Virtual Events & Digital Resources
5. Training
6. Assessment

Introduction to The Virtual Field



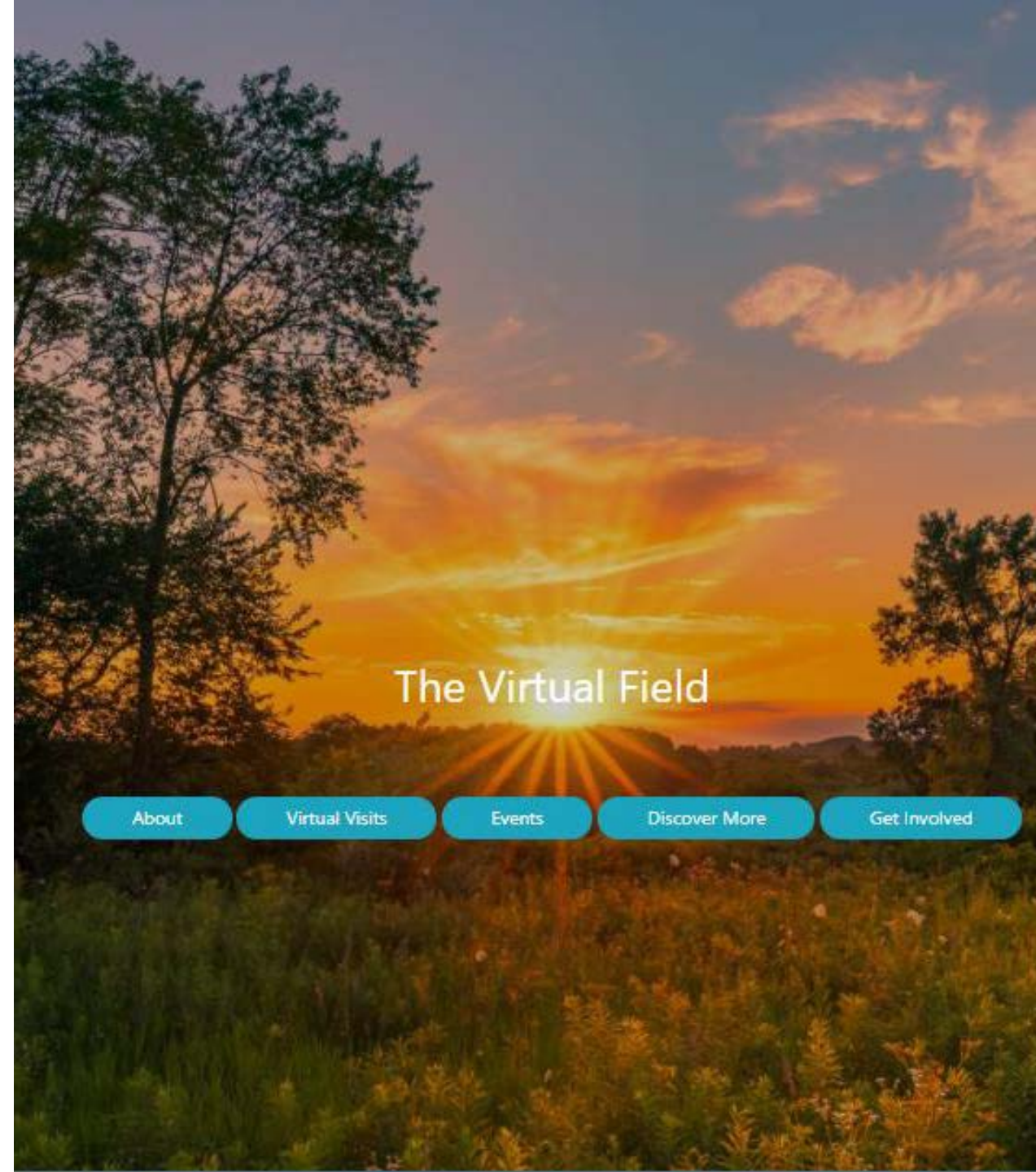
1. Web Portal

- ▶ Searchable databases of FSML virtual educational field experiences
- ▶ Back-end functions and user-friendly forms for FSMLs to share materials
- ▶ Robust: integrated with services of large-scale providers (YouTube, Facebook, WordPress)



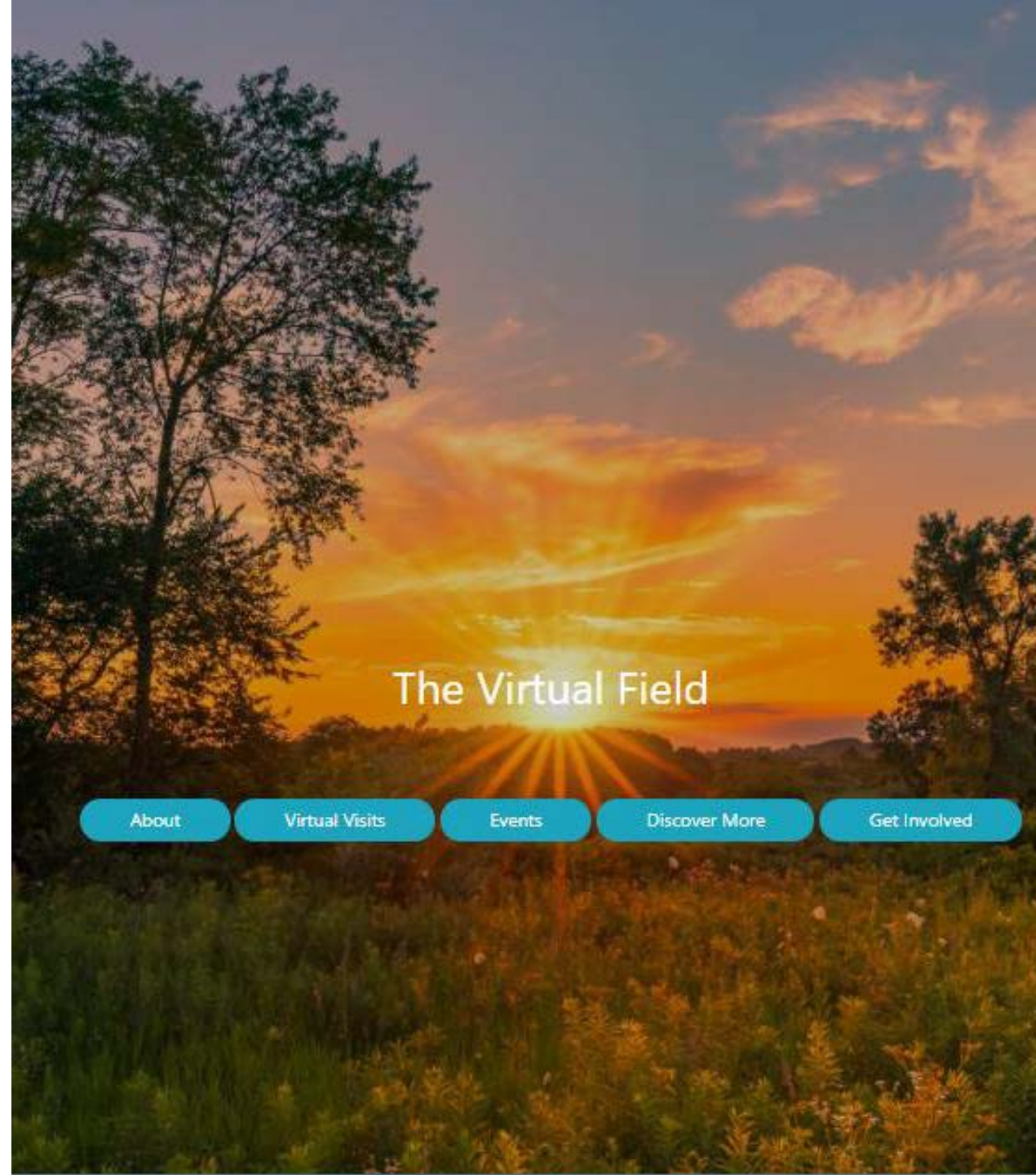
1. Portal Design

- ▶ LevitJones Holdings LLC
- ▶ Sarah Oktay, UC Davis
- ▶ Nazir Kassis, Consultant
- ▶ Chris Halle, Claudia Luke SSU
Center for Environmental Inquiry



1. Web Portal

▶ thevirtualfield.org



2. Ecosystem Exploration Videos

- ▶ Teach students observation and communication skills
- ▶ 5 minute point-of-view unnarrated videos
- ▶ filmed on smartphones by FSMLs
- ▶ linked to ESA's Four Dimensional Ecology Education Framework
- ▶ Assessment: U-FERN faculty surveys

What is an Ecosyste... ⋮



2. EE Video Production

Terrestrial



Jorge Ramos
Ben Bravo
& more

Freshwater



Patty Saunders
Beth Norman
& more

Marine



Itchung Cheung
Jennifer Seavey
& more

Ed Review



Claudia Luke
Angie Patterson
Patty Saunders
Beth Norman
Bill Hoese
& more

Technical



Sara Kassis
K. Steinhorst
Ben Bravo

2. EE Video Products

- ▶ 32 ecosystems, 17 FSMLs
- ▶ Explorer's guide + Instructor's guide
- ▶ Searchable by keyword, content, climate zone, biome, habitat, location

Member Login

The Virtual Field

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Find a Video

Enter search terms...

... or use the filters below:

Content Topics

Climate Zone

Biome

Habitat

Latitude

Min

Max

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Longitude

Min

Max

GO

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Ecosystem Exploration

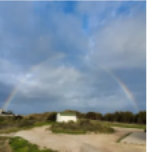
Virtual Visits | Ecosystem Exploration | Live from the Field | Events | Discover More

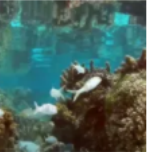
OBFS What is an Ecosyste... :
Explore marine, freshwater and terrestrial ecosystems at field stations and marine laboratories around the world. Each video comes with an Explorer's Guide and a Video Guide. (Instructors Only)


- [Instructor's Overview for Use in Classroom \(Sign-In Required\)](#)
- [Contribute a Video \(Sign-In Required\)](#)

Search Results:

 **Santa Rosa Island Torrey Pines**
Exploration of the rare Torrey Pines
The Torrey Pines only occur in 2 places in the world, here on Santa Rosa, ...
[Read More »](#)

 **Santa Rosa Island Rocky Intertidal Comparison**
Compare tide pools at Skunk point and Bechers Bay, Santa Rosa Island
You will walk through two very different rocky intertidal sites on Santa Rosa Island.

 **Kewalo Coral Reef**
An exploration of diversity on a coral reef in Palau.
coral reefs, fish herbivory, biodiversity among reef fish,

 **Stone Lab Lake Erie Coastal Ecosystem**
Habitats, Processes, Species Relationships
Exploration of diversity and connectedness of terrestrial, estuarine, wetland, and open water habitats of western ...
[Read More »](#)

3. Live from the Field Events

- ▶ Teach students about the process of field research
- ▶ Theme-based 50-min Webinar: 3 researchers at 3 field sites followed by live Q&A
- ▶ Instructor's Guides: background reading, assignments
- ▶ Assessment: Undergraduate Field Experiences Network (U-FERN)



3. LFTF Design and Production

- ▶ Kerry Wininger, Sonoma State Center for Environmental Inquiry
- ▶ Hilary Swain, Archbold Biological Station
- ▶ Angie Patterson, Black Rock Forest
- ▶ Claudia Luke, Sonoma State Center for Environmental Inquiry



3. LFTF Products

- ▶ 9 Events, 26 FSMLs, 3 networks (NEON, NutNet, LTER)
- ▶ Instructor Guides
- ▶ Themes: Fire, Carbon Sequestration, Climate Change...
- ▶ Searchable by keyword, topics, content, climate zone, biome, habitat

Find a Video

Enter search terms...

... or use the filters below:

 Topics ▼
 Continent ▼
 Climate Zone ▼
 Biome ▼
 Habitat ▼

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Live from the Field

Virtual Visits | Ecosystem Exploration | Live from the Field | Events | Discover More



Spend 50 minutes with researchers at field stations and marine laboratories around the world. Short presentations by researchers in the field are followed by audience questions and discussion. Here we present a searchable library of past events. For upcoming Live from the Field events, see [Events](#).

- [Instructor's Overview for Classroom Use \(Sign-in Required\)](#)
- [Contribute Your Own Video \(Sign-in Required\)](#)
- [Participate in an Event \(Contact Us\)](#)

Search Results:



Carbon Storage & Cycling

Carbon research using data from the National Ecological Observatory Network (NEON)

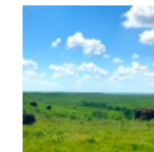
Smithsonian Environmental Research Center
Mountain Lake Biological Station
Niwot Ridge & the University of Colorado Mountain Research Station



Remote Sensing of Growth & Diversity

Studying biodiversity & growth using bioacoustic sensors and drones

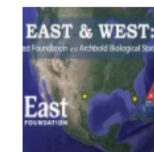
Fairfield Osborn Preserve, Center for Environmental Inquiry, Sonoma State University
Powdermill Nature Reserve, Carnegie Museum of Natural History
Schoolic Institute at Acadia National Park



Effects of Herbivores on Ecosystems

Impacts of herbivores like deer, elephants, and bison on ecosystems worldwide

Konza Prairie Biological Station
Black Rock Forest
Skukuza Research Station



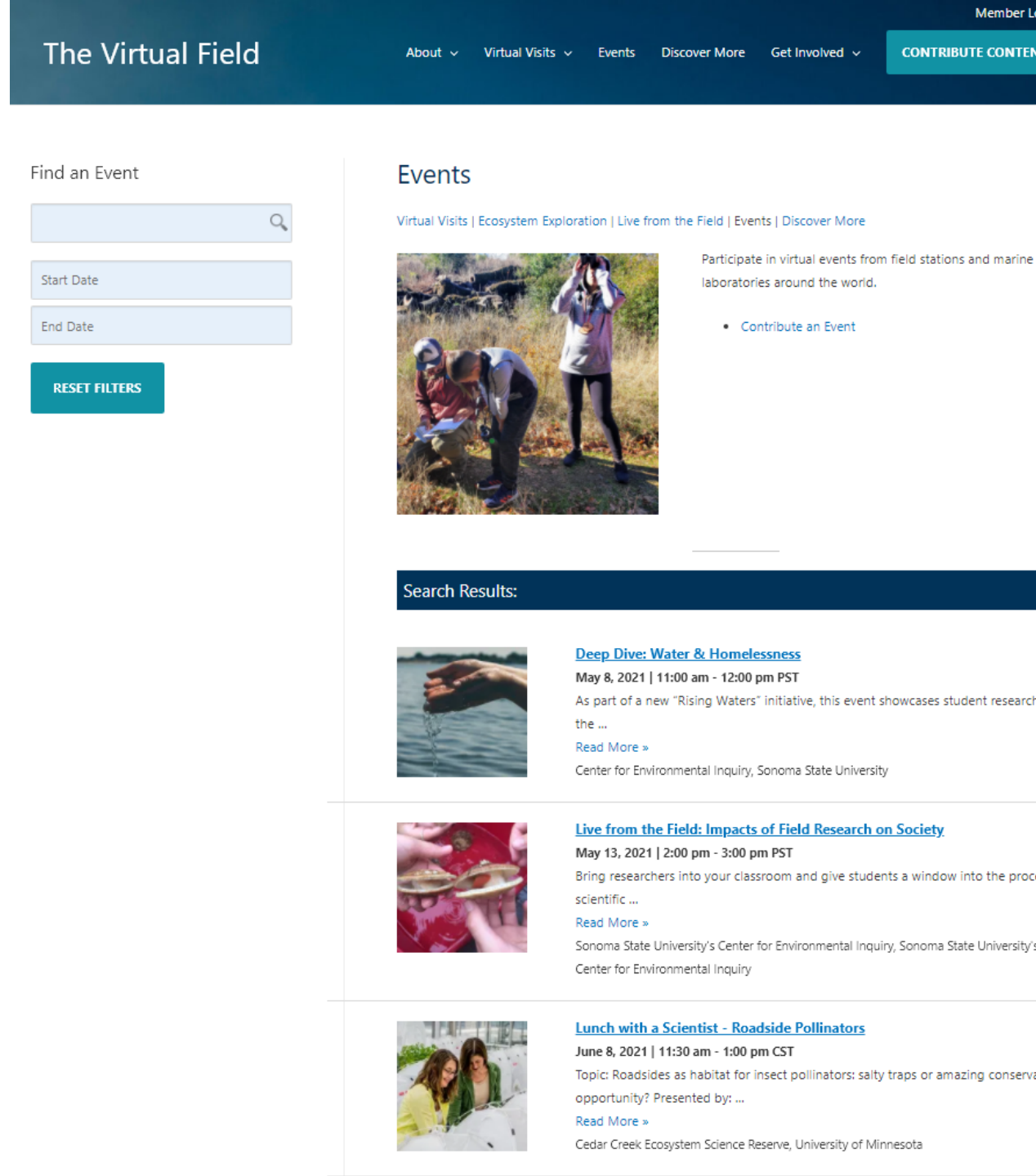
East and West

Comparing species at the East Foundation in Texas and Archbold Biological Station in Florida

Archbold Biological Station
East Foundation

4. Share Virtual Events

- ▶ Event advertisement to international audience
- ▶ Sends visitors to FSML registration pages
- ▶ 55 virtual events
- ▶ 10 FSMLs
- ▶ Searchable by keyword and date



The Virtual Field

Member L

About Virtual Visits Events Discover More Get Involved [CONTRIBUTE CONTENT](#)

Find an Event

Start Date

End Date

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Events

[Virtual Visits](#) | [Ecosystem Exploration](#) | [Live from the Field](#) | [Events](#) | [Discover More](#)


Participate in virtual events from field stations and marine laboratories around the world.

- [Contribute an Event](#)


Search Results:



[Deep Dive: Water & Homelessness](#)
May 8, 2021 | 11:00 am - 12:00 pm PST
As part of a new "Rising Waters" initiative, this event showcases student research the ...
[Read More »](#)
Center for Environmental Inquiry, Sonoma State University



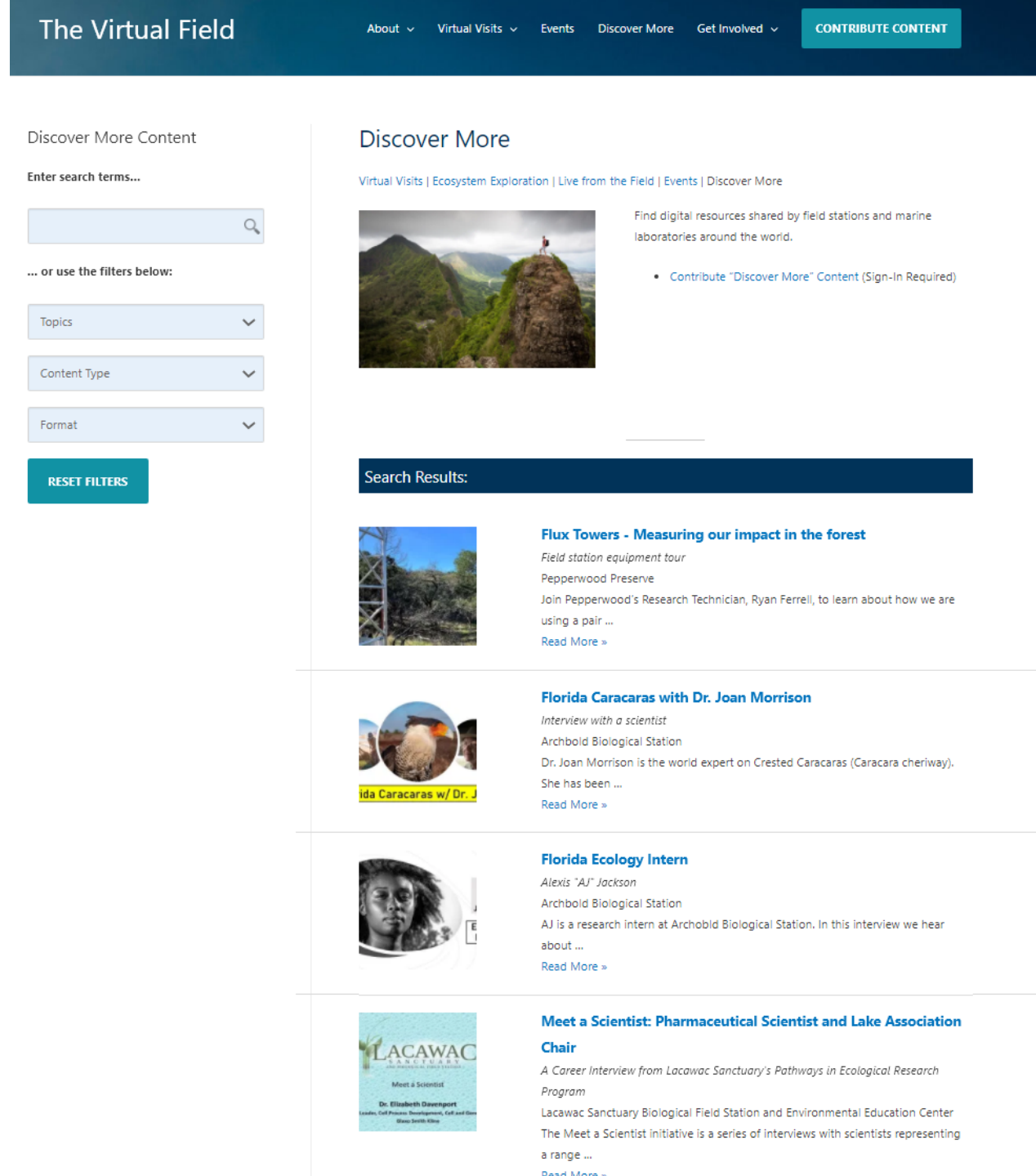
[Live from the Field: Impacts of Field Research on Society](#)
May 13, 2021 | 2:00 pm - 3:00 pm PST
Bring researchers into your classroom and give students a window into the process of scientific ...
[Read More »](#)
Sonoma State University's Center for Environmental Inquiry, Sonoma State University's Center for Environmental Inquiry



[Lunch with a Scientist - Roadside Pollinators](#)
June 8, 2021 | 11:30 am - 1:00 pm CST
Topic: Roadside as habitat for insect pollinators: salty traps or amazing conservation opportunity? Presented by: ...
[Read More »](#)
Cedar Creek Ecosystem Science Reserve, University of Minnesota

4. Share Digital Resources

- ▶ FSML maps, webcams, videos, imagery, etc.
- ▶ 33 digital resources
- ▶ Shared by 10 FSMLs
- ▶ Searchable by key word, topic, content, and format



The Virtual Field

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Discover More Content

Enter search terms...

... or use the filters below:

Topics | Content Type | Format

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Discover More

Virtual Visits | Ecosystem Exploration | Live from the Field | Events | Discover More

Find digital resources shared by field stations and marine laboratories around the world.

- [Contribute "Discover More" Content \(Sign-In Required\)](#)

Search Results:

- **Flux Towers - Measuring our impact in the forest**
Field station equipment tour
Pepperwood Preserve
Join Pepperwood's Research Technician, Ryan Ferrell, to learn about how we are using a pair ...
[Read More >](#)
- **Florida Caracaras with Dr. Joan Morrison**
Interview with a scientist
Archbold Biological Station
Dr. Joan Morrison is the world expert on Crested Caracaras (Caracara cheriway). She has been ...
[Read More >](#)
- **Florida Ecology Intern**
Alexis "AJ" Jackson
Archbold Biological Station
AJ is a research intern at Archbold Biological Station. In this interview we hear about ...
[Read More >](#)
- **Meet a Scientist: Pharmaceutical Scientist and Lake Association Chair**
A Career Interview from Lacawac Sanctuary's Pathways in Ecological Research Program
Lacawac Sanctuary Biological Field Station and Environmental Education Center
The Meet a Scientist initiative is a series of interviews with scientists representing a range ...
[Read More >](#)

5. Training Videos and Workshops

- ▶ Making Field Videos: Into Nature Films (Jennifer Brown)
 - Part I: Filming in the Field (20 min)
 - Part II: Editing (20 min)
- ▶ Production of Ecosystems Exploration Videos, Live from the Field Events
- ▶ **360 Immersive Field Trips**





Outcomes

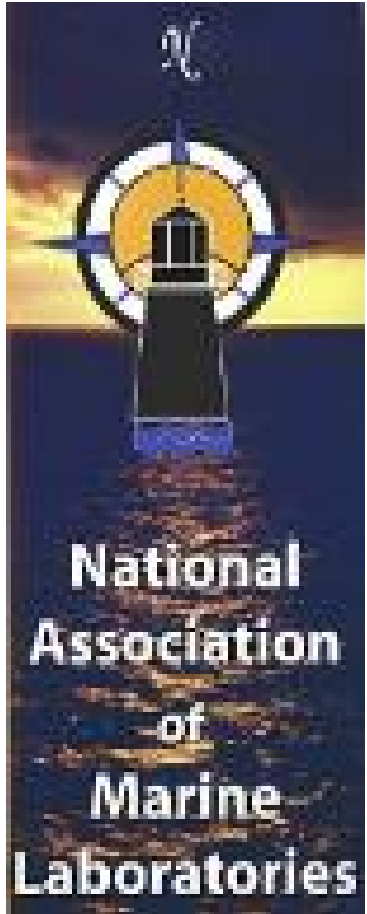


FSML Collaborators: 26 states, 6 countries

Stacy McNulty	Adirondack Ecological Center of SUNY
Hilary Swain, Dustin Angell, Betsy Boughton	Archbold Biological Station
Patricia Saunders	Black Fork Wetlands Environmental Studies Center
Bill Schuster, Angie Patterson	Black Rock Forest
Caitlin Barale Potter	Cedar Creek Ecosystem Science Reserve
Gil Rosenthal, Rhonda Struminger	Centro de Investigaciones Científicas de las Huastecas "Aguazarca"
Greg Eaton	Claytor Nature Center
Eli Goodsell, Anne Kelly, Jason Wallace	CSU Chico Ecological Reserves
Claudia Luke, Ben Bravo, Suzanne DeCoursey, Kerry Wininger, Chris Halle, Sara Kassis	CSU Sonoma State Preserves
Sandra Nierzwicki-Bauer, David Diehl	Darrin Fresh Water Institute
Teresa Mourad	Ecological Society of America
Karina Nielsen	Estuary & Ocean Science Center
Becky Schmitthenner, Kathryn Malinowski	Forfar Field Station
Megan Dether	Friday Harbor
Jennifer Hunter	Hastings Natural History Reservation
Itchung Cheung	Hatfield Marine Science Center
Brian Kloepfel	Highlands Biological Station, Coweeta Hydrologic Laboratory, Great Smoky Mountains National Park
Ian Halm	Hubbard Brook Experimental Forest
Phoebe Jekielek	Hurricane Island Center for Science and Leadership
Lesley Knoll	Itasca Biological Station and Laboratories
Tony Barnosky/Jorge Ramos	Jasper Ridge Biological Preserve
Ted Karfakis	Kalamos Island Biological Field Station
Deedra McClearn	La Selva Biological Station
Beth Norman	Lacawac Sanctuary
Laura Roketenetz	Martin Center for Field Studies and Environmental Education
Renée Brown	McMurdo Dry Valleys, Antarctica
Robin Verble	Missouri S&T Ozark Research Field Station

Beth Braker, Donovan Tye, Sofia Rodriguez	OTS Costa Rica and South Africa
Lisa Micheli, Margaret Boeger	Pepperwood Preserve
Cori Zawacki	Pymatuning Lab of Ecology
Sonia Nobrega	Queen's University Biological Station
Jennie Reithel, Ian Billick	Rocky Mountain Biological Laboratory
Eric Milbrandt	Sanibel-Captiva Conservation Foundation
Russ Bradley	Santa Rosa Island Research Station
Sarah Ferner	SF Bay National Estuarine Research Reserve, China Camp State Park and Rush Ranch Open Space Preserve
Jennifer Seavey	Shoals Marine Laboratory
Lisa Busch	Sitka Sound Science Center
Brendan Blowers De León	Southern Nazarene University's Quetzal Education Research Center
Steven Gibson	Stengl Lost Pines Biological Field Station
Jacob O'Connell	SUNY College of Environmental Science and Forestry
Cheryl Goodie	The Ecological Research Center and Meeman Biological Station
Kristin Stanford, Brian Alford	The Ohio State University's Stone Laboratory
Chris Lorentz	TMU Ohio River Biology Field Station
Amanda Young	Toolik Field Station
Sarah Oktay	UC NRS Davis Reserves
Jennifer Gee, Aldo De La Mora Roderiguez	UC NRS James San Jacinto Mountains Reserve
Catherine Koehler	UC NRS McLaughlin Reserve
Marion Wittmann	UC NRS Santa Barbara Reserves
Kate McCurdy	UC NRS Sedgwick Reserve
Kari O'Connell	UFERN
Amy Vaughan Whipple	University of Arizona
Damon Gannon	University of Georgia Marine Institute
Alicia Farmer	University of Michigan Biological Station
Renée Brown	UNM Sevilleta Field Station
Zoë Goodrow	Upham Woods Outdoor Learning Center
Cora Johnston	Virginia Coast Reserve LTER, Anheuser-Busch Coastal Research Center

Network Collaborations



Natural Reserve System
university of california

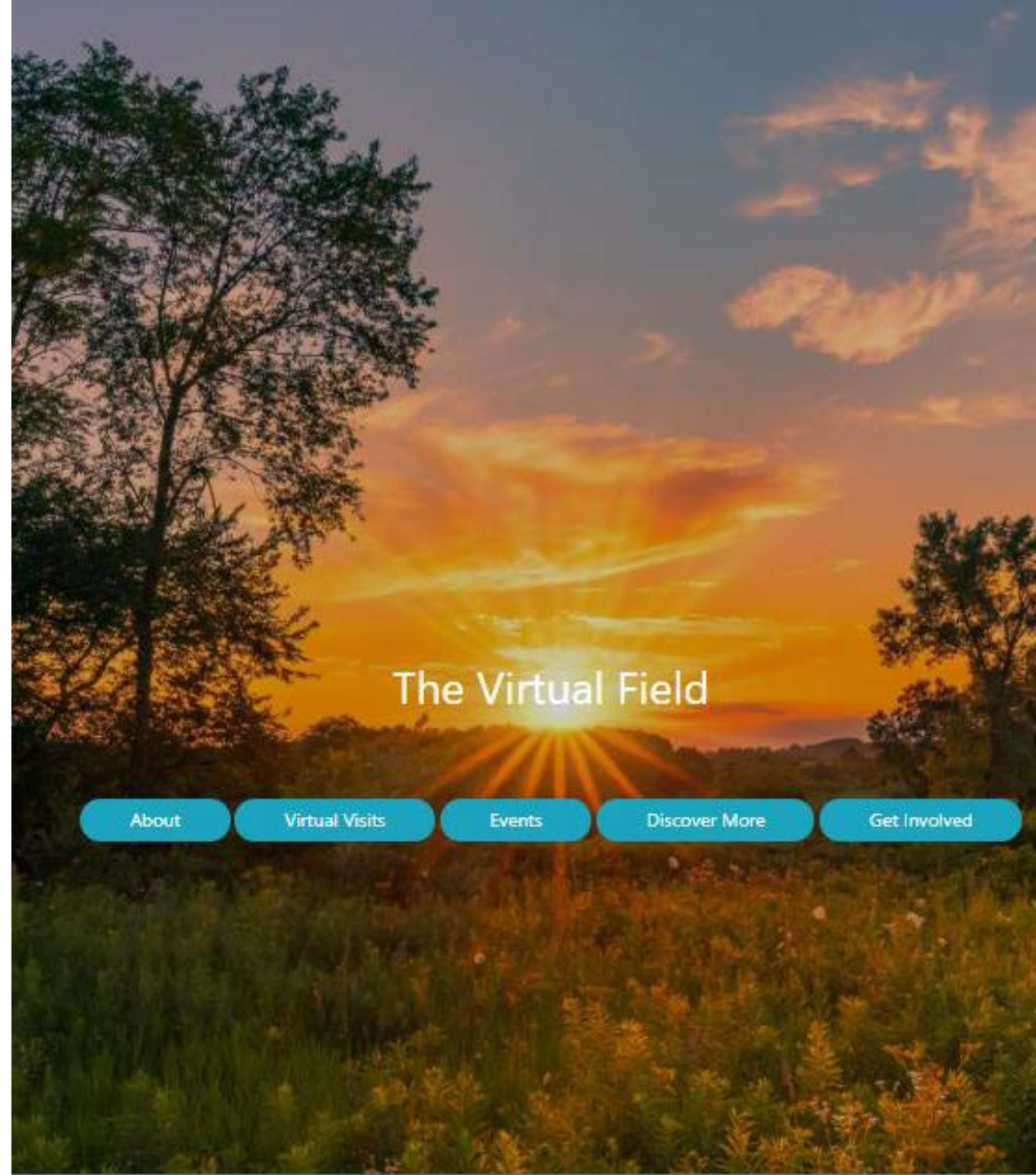


Organization for Tropical Studies



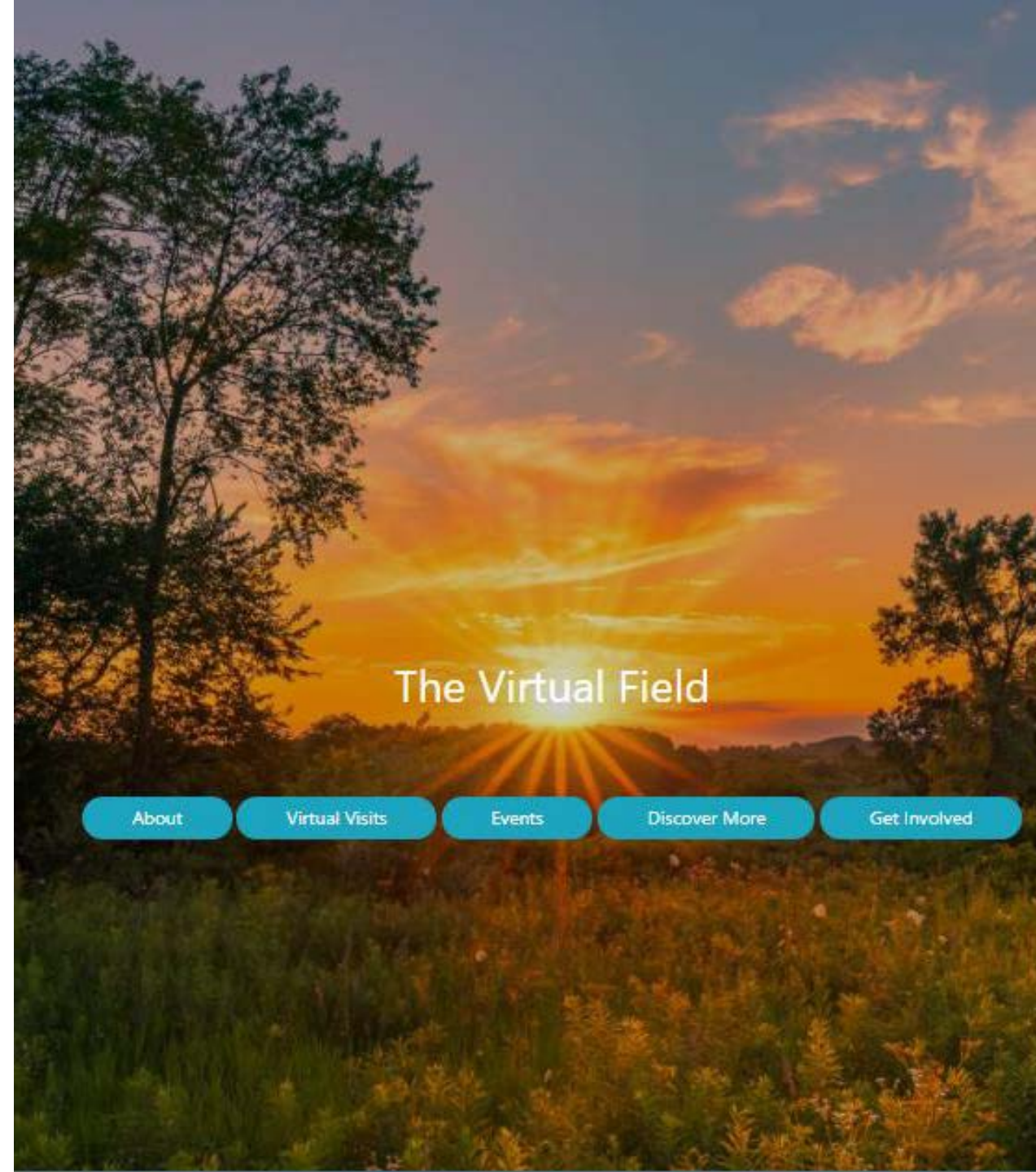
Web Portal 9/20-4/21

- ▶ 23,089 page views
- ▶ 5,857 total unique visitors
- ▶ 8,264 sessions
- ▶ United States (4,395 views), United Kingdom (215), Canada (140), Germany (52), China (45), India (45), Australia (39), Brazil (38), Japan (37)



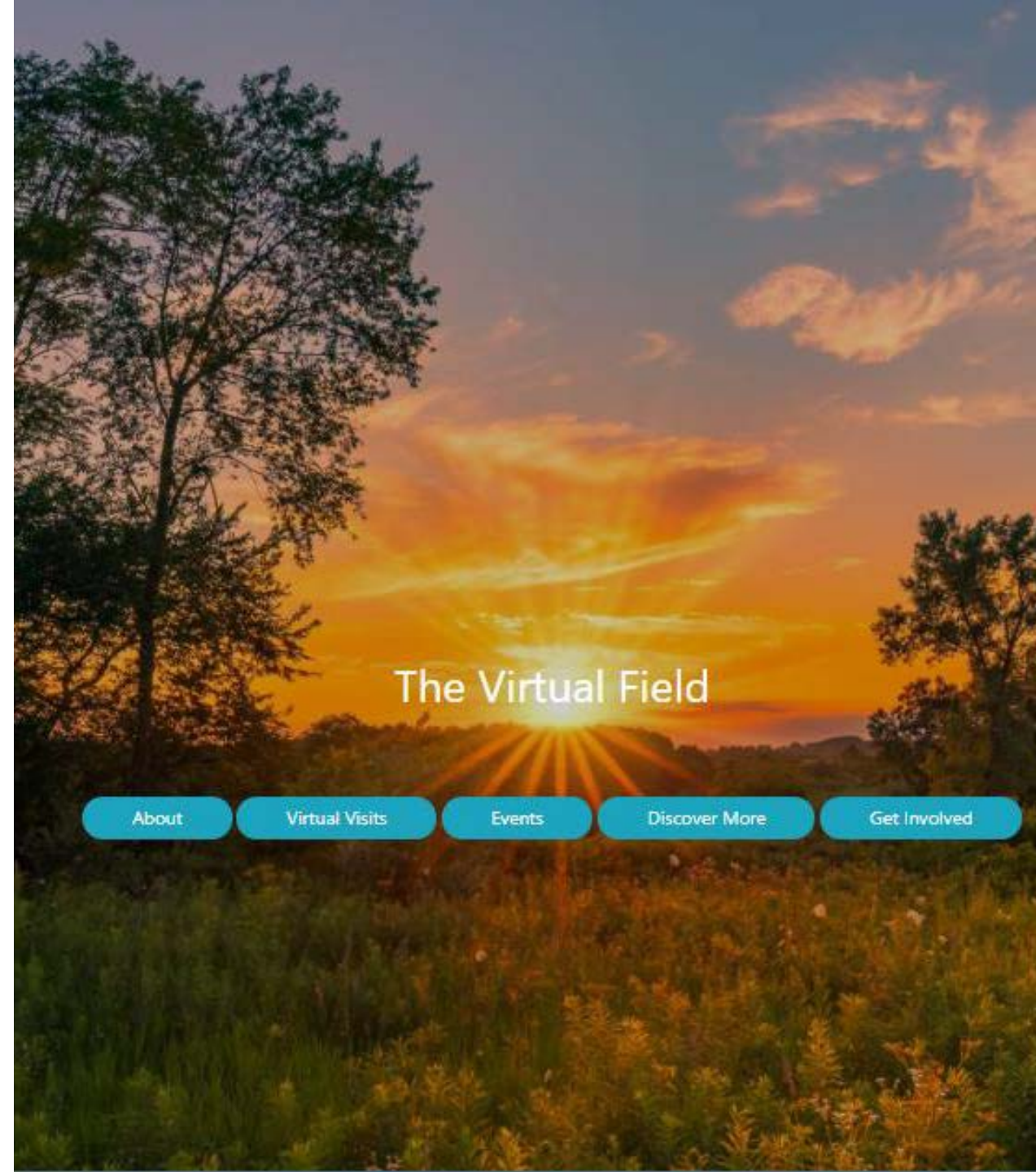
Videos

- ▶ 54 views/month/video: The Virtual Field introductory videos
- ▶ 48 views/month/video: Live from the Field
- ▶ 35 views/month/video: Nature Video Techniques
- ▶ 21 views/month/video: Ecosystem Exploration Videos



Participant Affiliations

- ▶ 122 US universities
- ▶ 20 International universities
- ▶ 56 Education centers, non-profits
- ▶ 31 FSML staff
- ▶ 10 K-12 schools
- ▶ 3 Foundations
- ▶ 17 Businesses



University Courses

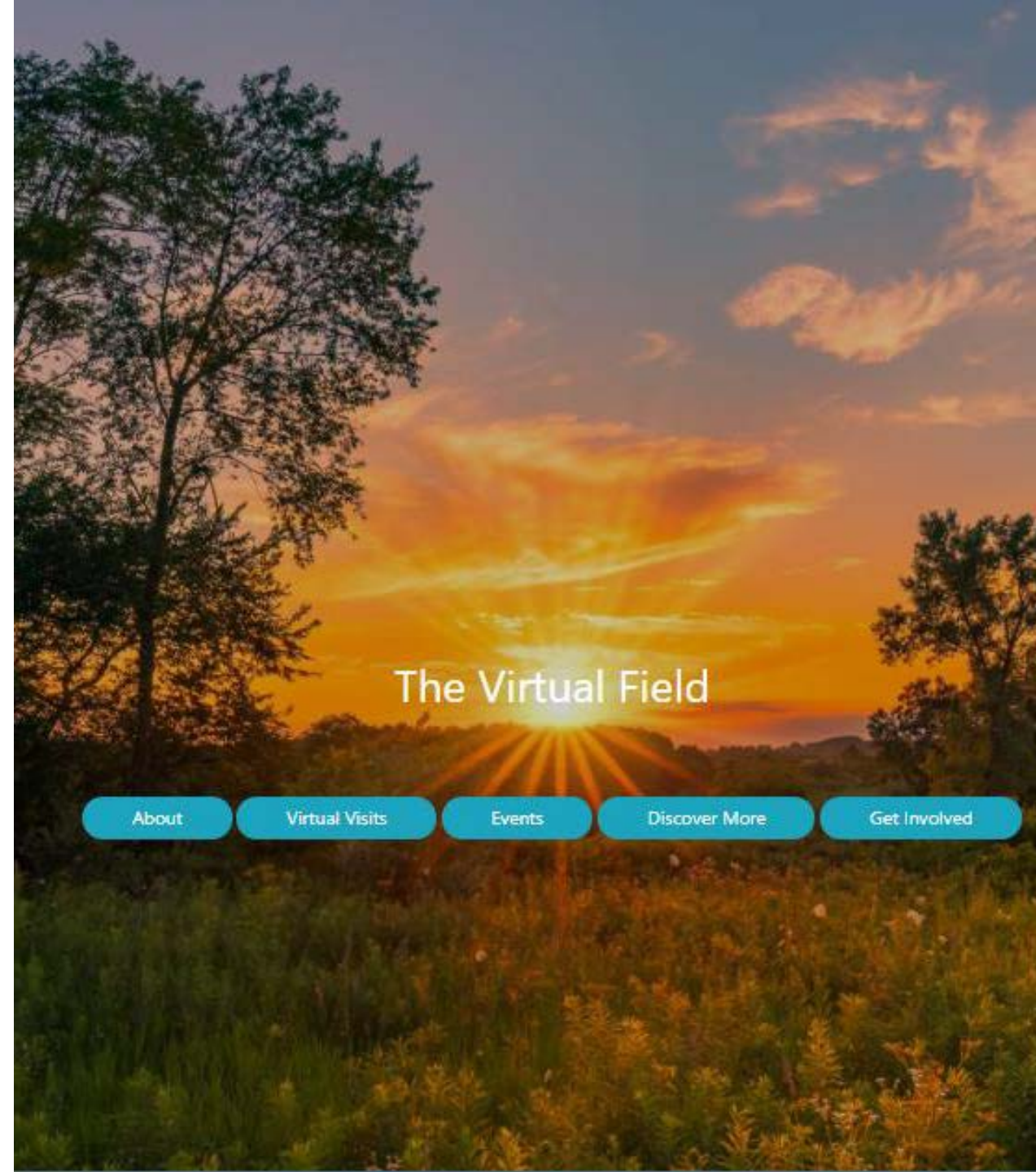
- ▶ Chemistry: introductory chemistry
- ▶ Earth Sciences: planetary geology, field geology
- ▶ Ecology: ecological processes, ecosystem ecology, social ecological systems, population ecology, ecology and environmental science, general ecology, landscape ecology
- ▶ Field Methods: quantitative field methods, a watershed year
- ▶ Freshwater Aquatic Systems: lakes, streams and rivers, freshwater ecology,
- ▶ Geography: environmental remote sensing
- ▶ Marine Aquatic Systems: the ocean planet, marine environmental Issues
- ▶ Marine Biology: coastal marine biology, biological oceanography, estuarine biology
- ▶ Microbiology: bacteriology, microbiomes
- ▶ Terrestrial Biology: natural history, introductory biology, California naturalist, botany, zoology, invertebrate biology, invertebrate zoology, trees and forests, conservation biology
- ▶ Sustainability: sustainability and resilience

Professions of Attendees

Hydrologist, physical scientist, ecologist, biologist, health scientist, rangeland specialist, natural resources specialist, restoration ecologist, interpretive ranger, aquatic biologist, environmental educator, soil practitioner, veterinarian, farmer, biological resources analyst, sustainability specialist, artist, administrator, director, water quality manager, chemist, clinical associate professor, tribal historic preservation officer, watershed coordinator, water/environmental technician, engineer, botanist, entomologist, geographic information systems, forester, environmental scientist, development and events coordinator, earth and space exploration, librarian, board member, fire management, microbiologist, botanist, ecologist, and conservation biologist

Lessons Learned

- ▶ Attractive features are cross-site comparisons, flexibility of application (360 video?)
- ▶ Technology is an attractant and a barrier. Must be easy to make, easy to use and must provide support (workshops, videos, one-on-one support)
- ▶ Value must be communicated to faculty and FSMLs





Next Steps



Expand Products & Services

- ▶ Larger libraries
- ▶ Digital learning communities
- ▶ Social interaction across sites
- ▶ New series:
 - Shadow a professional
 - 360 ecosystems
 - Make your own cross-site tours



Increase Rigor and Assessment

- ▶ What are students learning?
- ▶ How are faculty using materials?
- ▶ What aspects of FSML learning experiences can we recreate?
- ▶ Does 360 immersive experiences improve outcomes?



Expand Participation of Students

- Disadvantaged and under-represented students
- Large classes
- Community College and MSIs
- More disciplines
- K-12
- Informal
- International



Expand Participation of Faculty

- ▶ Participation after pandemic
- ▶ Curriculum integration
- ▶ Multiple disciplines



Expand Participation of FSMLs

- Participation after pandemic
- Integration with in-person programs
- Use tracking
- Ease of participation
- Skills training
- Network partnerships



Sustainable Funding

- ▶ Broader impacts services
- ▶ Grant Proposals: NSF RCN UBE Incubator Grant; NSF Unsolicited, foundations
- ▶ Sustainable funding model



Technology that connects us to
the planet





Thank you

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