

Understanding the socioeconomic drivers of agricultural land abandonment and associated fire risk in Greece

Aaron Sparks, Chloe Wardropper, Alex Maas, Luigi Boschetti
University of Idaho, USA

Ioannis Gitas
Aristotle University of Thessaloniki, Greece

Chariton Kalaitzidis
Mediterranean Agronomic Institute of Chania, Greece



Smoke from 2018 fires near Athens, Alkis Konstantinidis/Reuters

Understanding the socioeconomic drivers of agricultural land abandonment and associated fire risk in Greece



Aaron Sparks
Dept. Forest, Rangeland,
Fire Sciences; UI



Chloe Wardropper
Dept. of Natural
Resources and Society; UI



Alex Maas
Dept. of Agricultural Economics
and Rural Sociology; UI



Luigi Boschetti
Dept. Forest, Rangeland,
Fire Sciences; UI



Ioannis Gitas
Dept. Forestry and Natural
Environment; Aris. U. Thess.
GOFC-GOLD MedRIN member



Chariton Kalaitzidis
Dept. Forestry and Natural
Environment; Med. Ag. Inst.
GOFC-GOLD MedRIN member

Research Motivation

Background:

- Greece is a heterogenous landscape, with agriculture and settlements interspersed within shrubland and forest
- Shifts in workforce from farming to service/tourism sector since 1950's
- Several EU Common Agriculture Policy reforms (e.g. 1993, 2000) reducing cereal crop subsidies
- Economic crisis (2008)
- Fires resulting in civilian fatalities are common (11.8 per 100 kha burned)



Mixed agriculture, settlement, wildland vegetation landscape in Attica, Greece



2018 fire aftermath: Rafina, Greece; NYT

Study goal and Research Questions

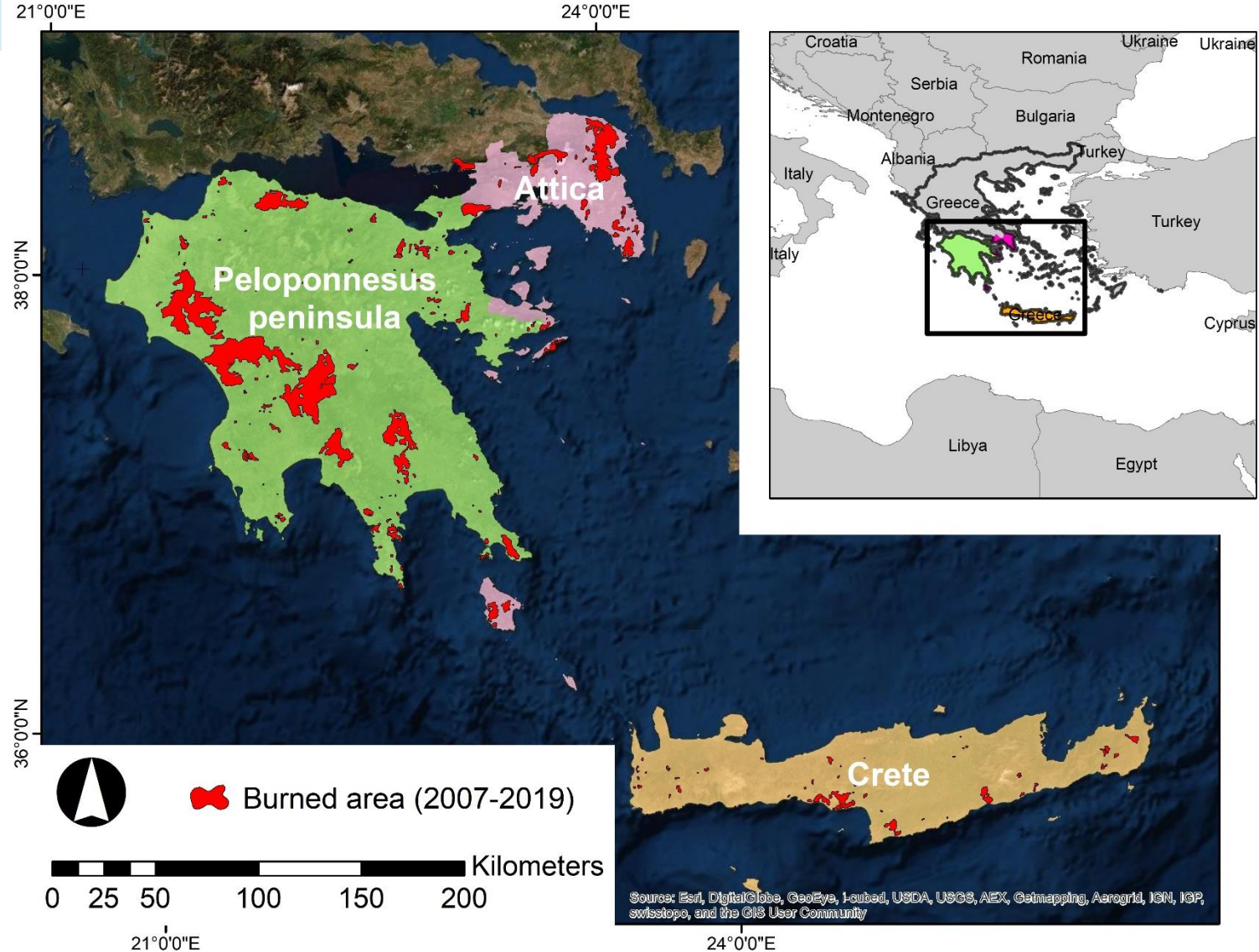
Overarching Goal:

Quantify the causes and consequences of agricultural land abandonment during the last few decades (1990-2020) in Greece to inform fire-conscious policy and land planning

Research questions:

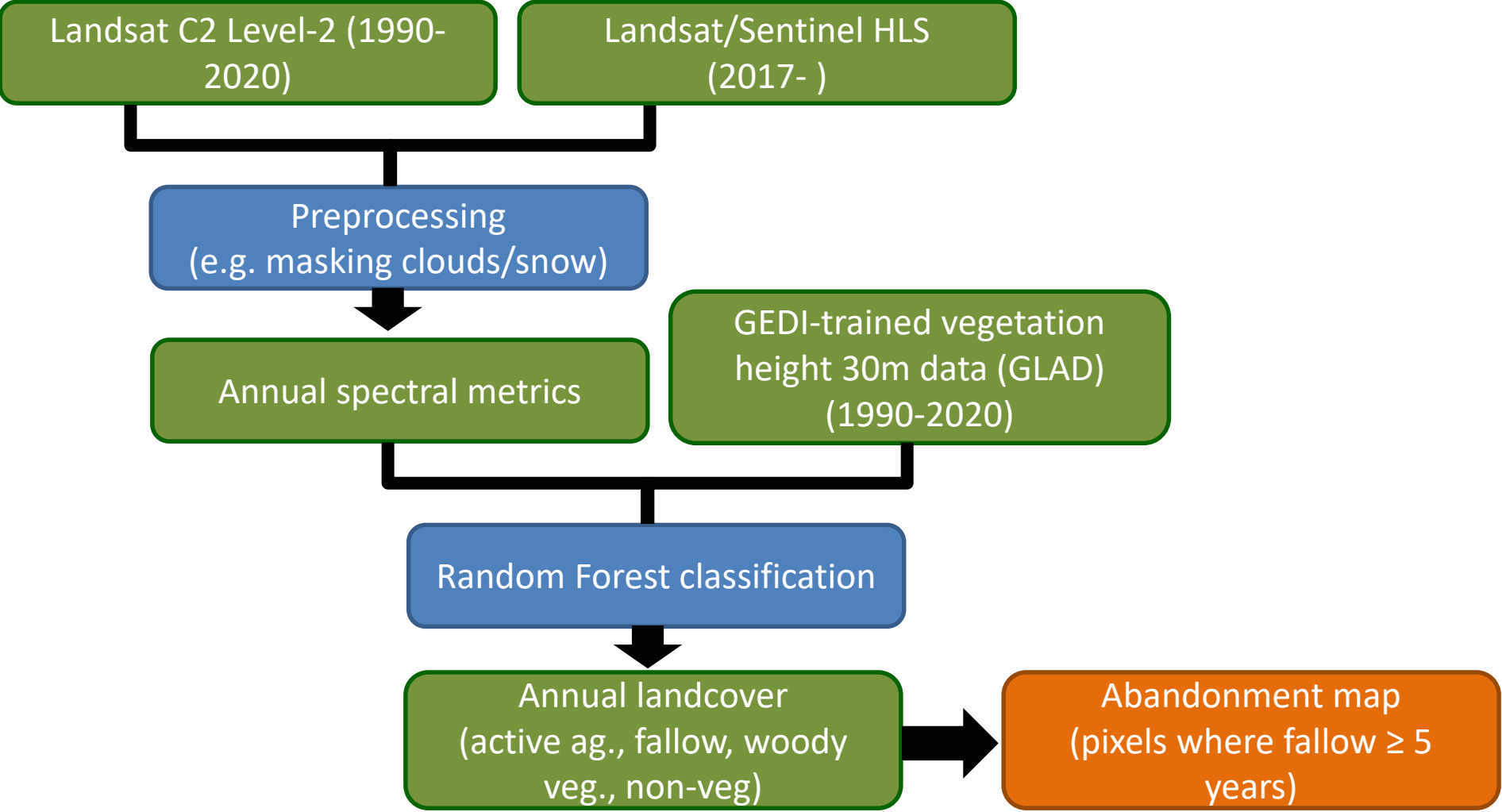
- Where/when has abandonment occurred?
- What are the socioeconomic drivers of abandonment?
- Impacts of abandonment on fire risk?
- What land management and policy actions are most likely to be adopted?

Study Area



Where and when has agricultural abandonment occurred in southern Greece?

- **Objective:** Map the extent and timing of agricultural land abandonment using LTS analysis



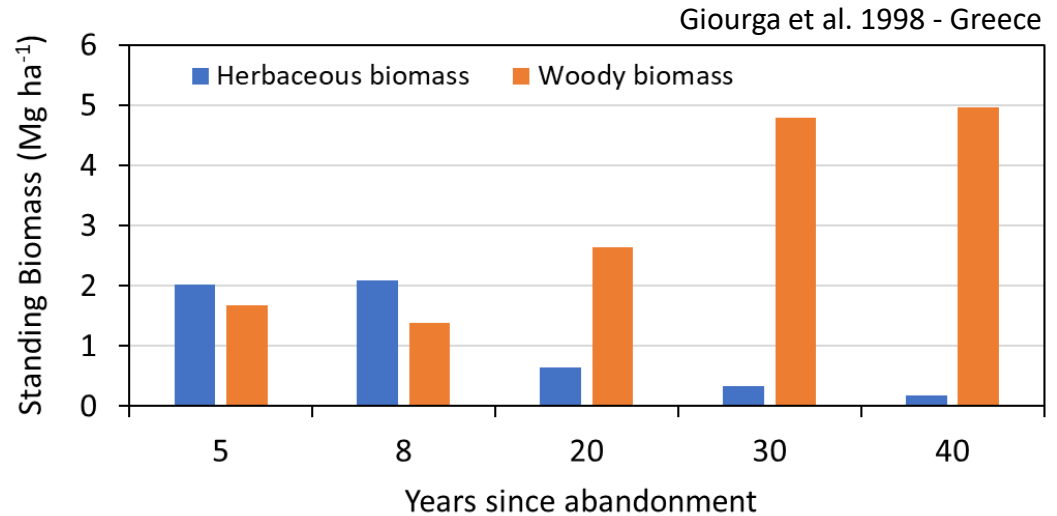
What are the strongest drivers – and interactions between drivers – of agricultural land abandonment?

- **Objective:** Use spatially explicit multivariate analyses to identify geophysical, socioeconomic, and sociocultural drivers of agricultural land abandonment, with a focus on cultural identity and family legacy.
- Drivers of agricultural land abandonment socioeconomic identified using spatially explicit multivariate regression modeling
 - Response variable: **agricultural land abandonment area**
 - Explanatory variables: **geophysical** (elevation, slope, mean precipitation), **socioeconomic** (population change, crop price, land market price, market access), **sociocultural** (community cohesion, values)
- Multiple models built for several time periods (e.g. 1993-2000, 2000-2008, 2008-2020) to assess temporal changes in the influence of explanatory variables
- Landowner interviews conducted in Year 2 to contextualize socioeconomic and sociocultural drivers of agricultural land abandonment

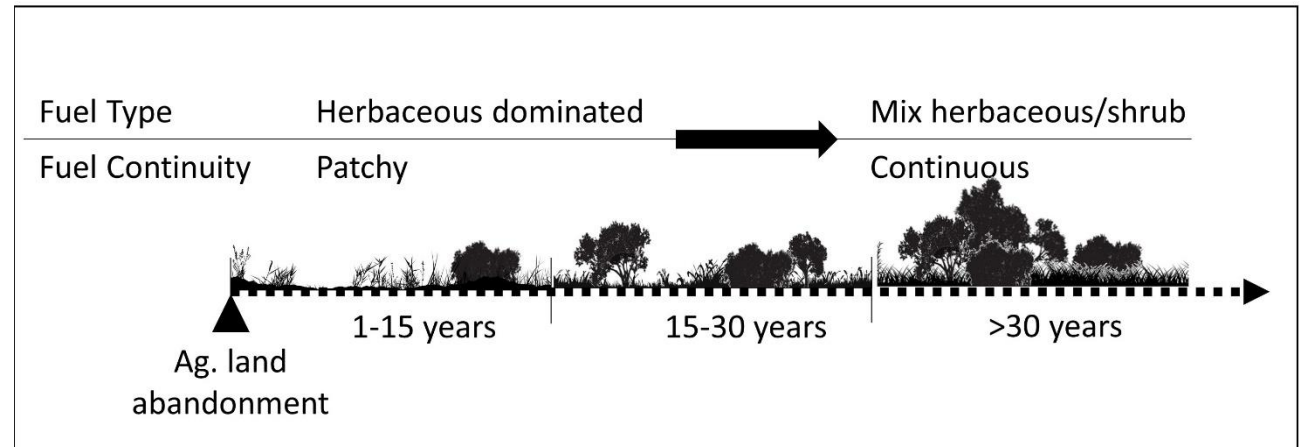
What are the impacts of agricultural land abandonment on fire risk?

- **Objective:** Quantify changes in fire risk components (probability and intensity) as a function of time since abandonment

Post-abandonment
fuel dynamics



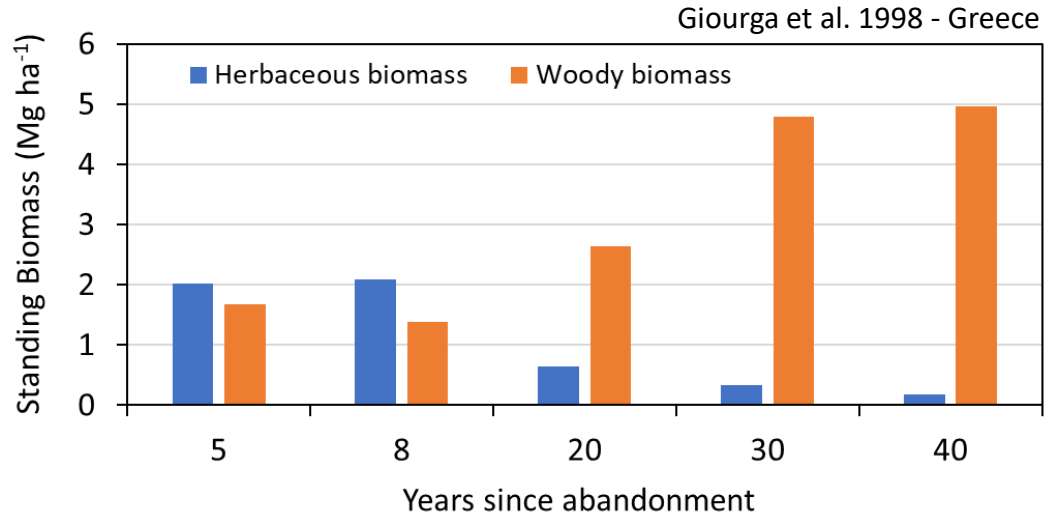
Why important?



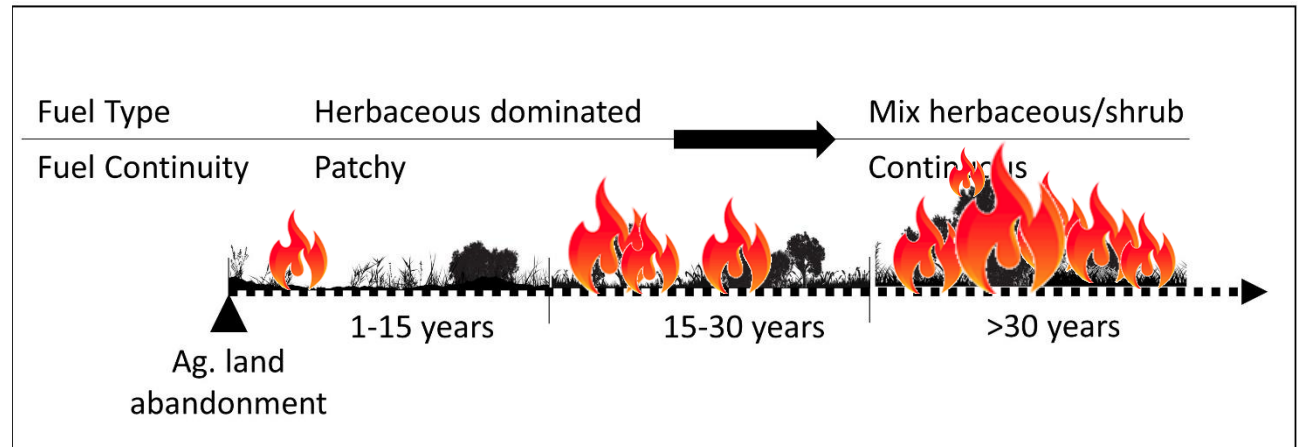
What are the impacts of agricultural land abandonment on fire risk?

- **Objective:** Quantify changes in fire risk components (probability and intensity) as a function of time since abandonment

Post-abandonment
fuel dynamics



Why important?
>> **Increased fire spread,
fire intensity with time-
since-abandonment**

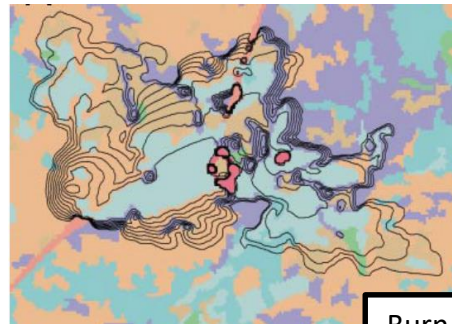
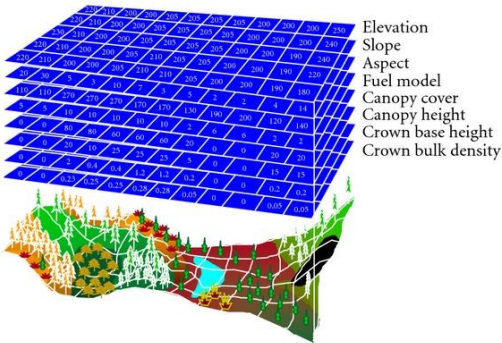


Objective: Quantify changes in fire risk components (probability and intensity) as a function of time since abandonment

Fire simulation modeling using Flammap

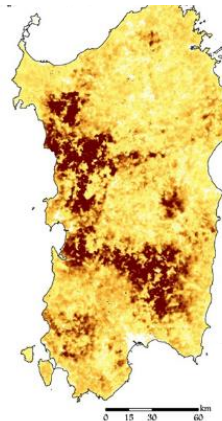
Input data
(topography, fuel,
weather, ignition probability)

Simulate thousands of
individual fires

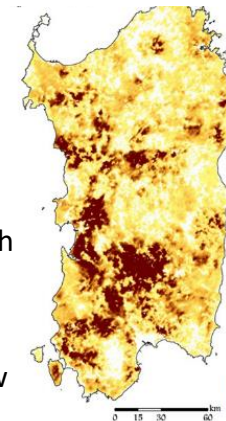


Landscape level burn probability

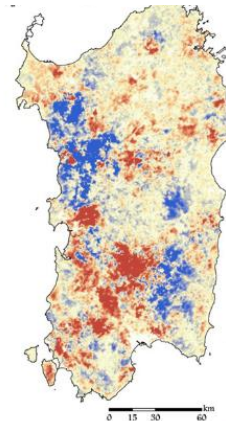
Burn probability
timepoint 1



Burn probability
timepoint 2



Burn probability
change



High
Low

Salis et al. *Natural Hazards*, 2014

Which types of interventions are most likely to induce fire-conscious land management on actively-farmed or abandoned land?

Objective: Use a discrete choice experimental survey method to identify policies (e.g. subsidies, education, behavioral nudges) most likely to promote fire-conscious land management.

- Two-part survey to identify place-based solutions for reducing fire risk
 - Part 1: Demographics, fire risk perception, individual values, community cohesion
 - Part 2: Choice experiment where respondents choose between alternative policies (e.g. incentives vs regulation vs direct management) and the enacting governmental entity
- Survey data analyzed with multinomial logit model to assess which policies and enacting entities are most likely to be supported

Project Schedule

Project Objectives and Milestones	Year 1 (2021-2022)		Year 2 (2022-2023)		Year 3 (2023-2024)	
Milestone 1: Complete Objective 1 - agricultural abandonment mapping	■	■				
Socioeconomic dataset collection (Objective 3)	■	■				
Scoping areas/participants for Objective 3 & 4 surveys		■	■			
Milestone 2: Complete Objective 3 - socioeconomic analysis spatial regression modeling			■	■	■	
Fire risk input data collection/creation (Objective 2)			■	■		
Milestone 3: Complete Objective 2 – fire risk analysis				■	■	■
Milestone 4: Complete Objective 4 – two-part landowner survey				■	■	■
Dissemination of results via publications and research briefs		■		■		■
Milestone 5: Delivery of project datasets to NASA DAAC						■

Thank you for your attention

