

**Features and applications  
of the Map-Me Public Participation GIS**

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**March 13<sup>th</sup>, 2014**



## Outline

- Terminology
- Goals of PPGIS
- Components of an online PPGIS
- Features of the Map-Me PPGIS tool
- Post-processing of Map-Me data
- Case study: Public perceptions of environmental change on the Flathead Indian Reservation
- Creation of a Map-Me survey



**Terminology**

## **Public Participation**

Involvement of stakeholders potentially affected by a decision, implying their capacity to influence the final decision. Based on the principle that those affected by a decision should participate in the decision-making process.

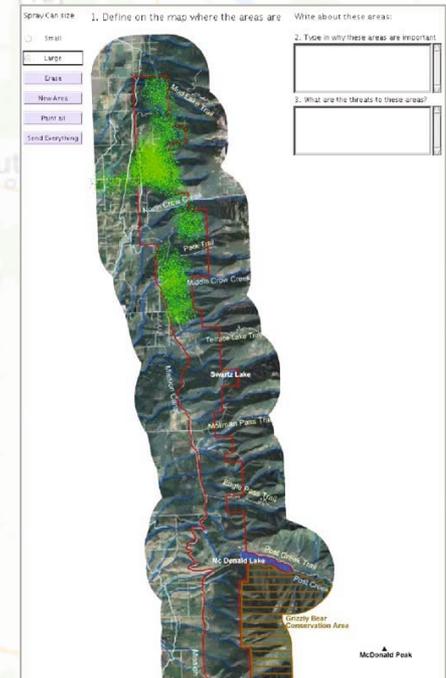


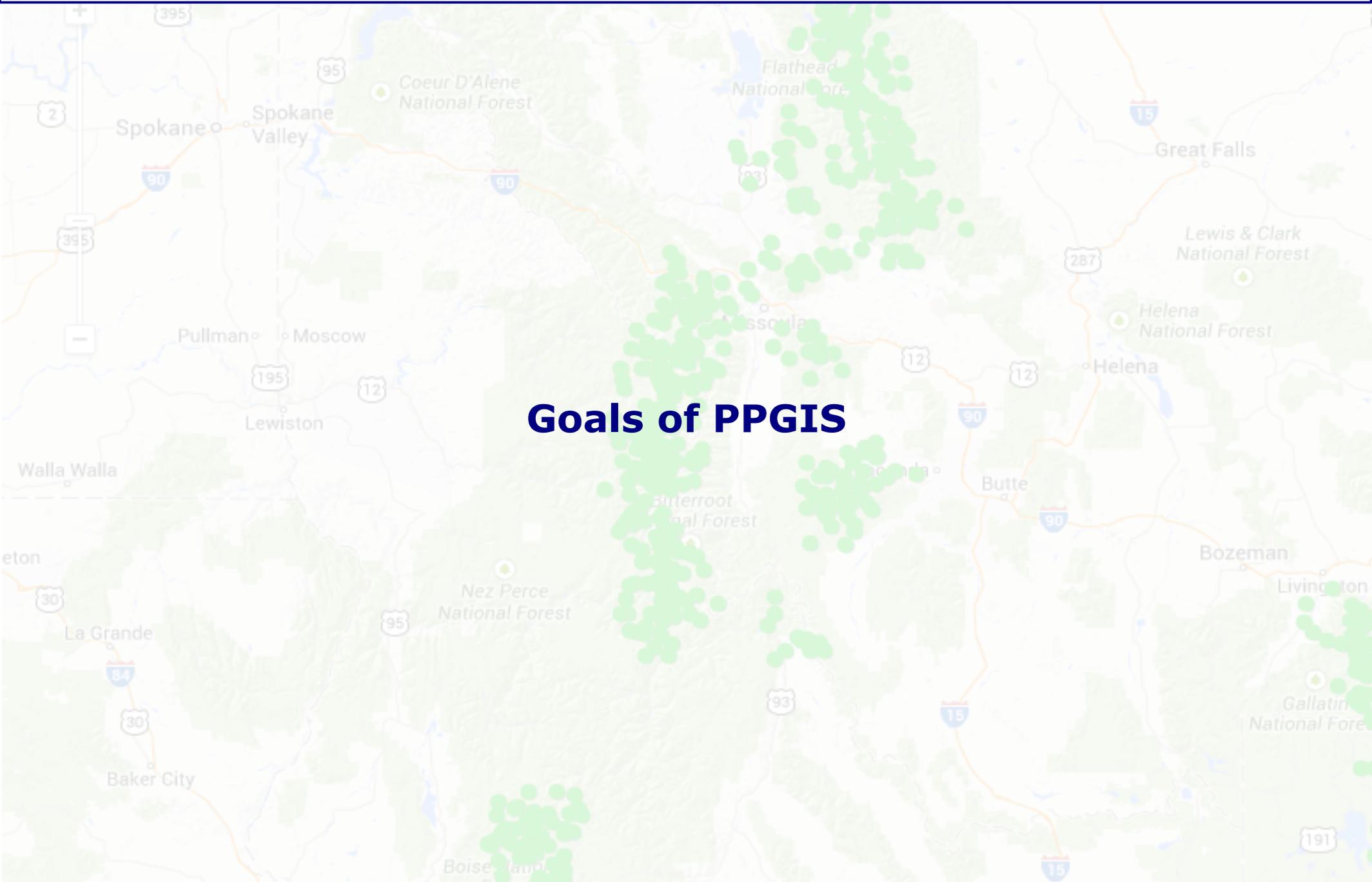
### **Public Participation**

- Design and Implement Public Meetings
- Interview Key Stakeholders
- Engage Community
- Build Trust in the Process
- Create Public Support for the Plan

## Participatory GIS / Public Participation GIS

Involvement of local groups in the creation of GIS data and its use in spatial decision-making processes that affect them.





**Goals of PPGIS**

## Goals of PPGIS

Democratize GIS teaching and usage, so that it is accessible to and understood by the widest possible range of communities and groups.



## Goals of PPGIS

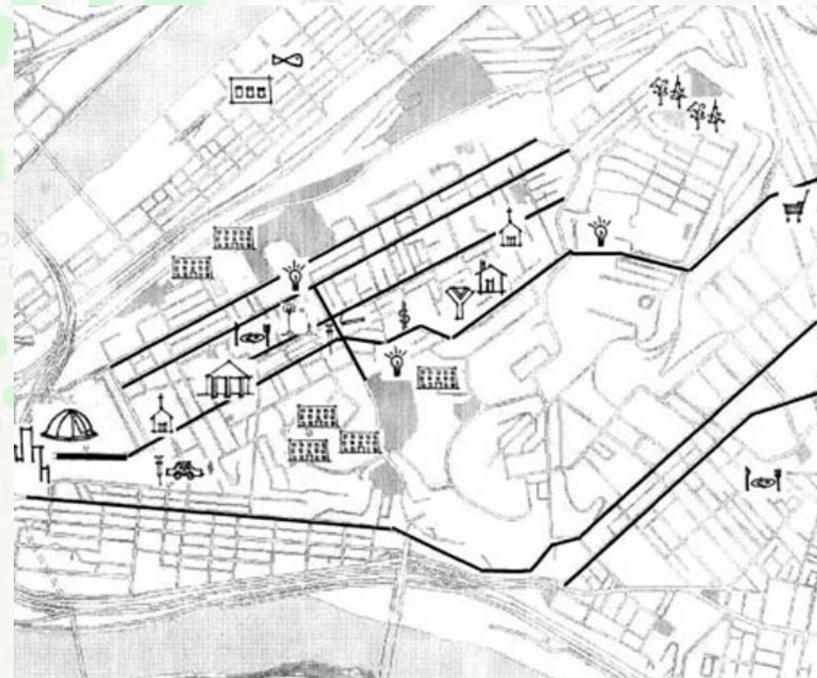
Make citizens participate in spatial planning and policy-making.



Levels of participation

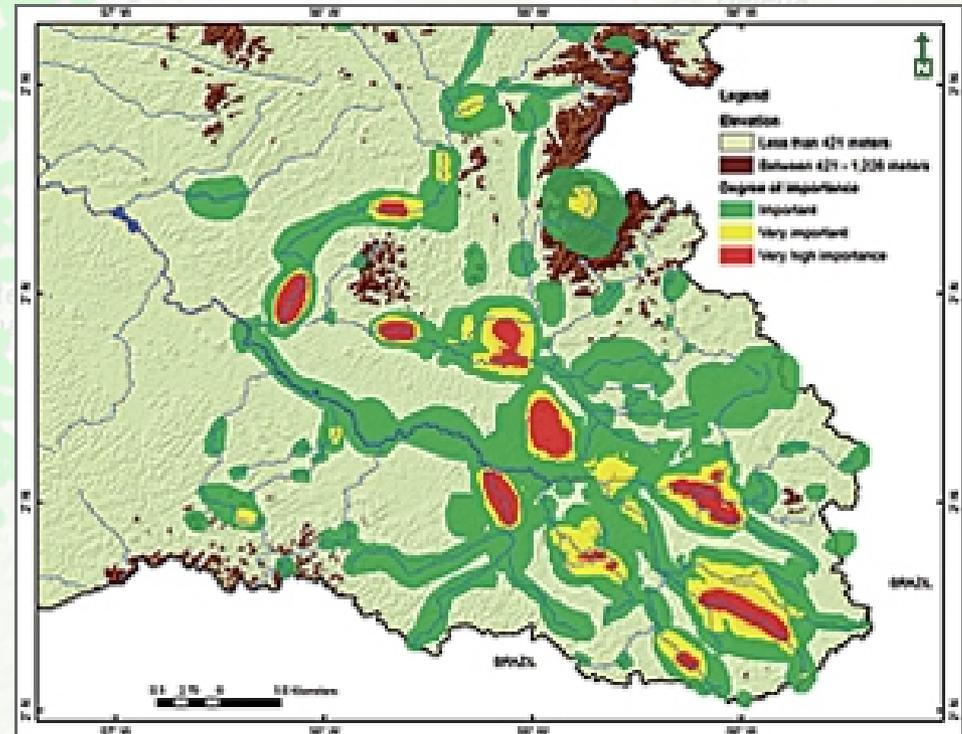
## Goals of PPGIS

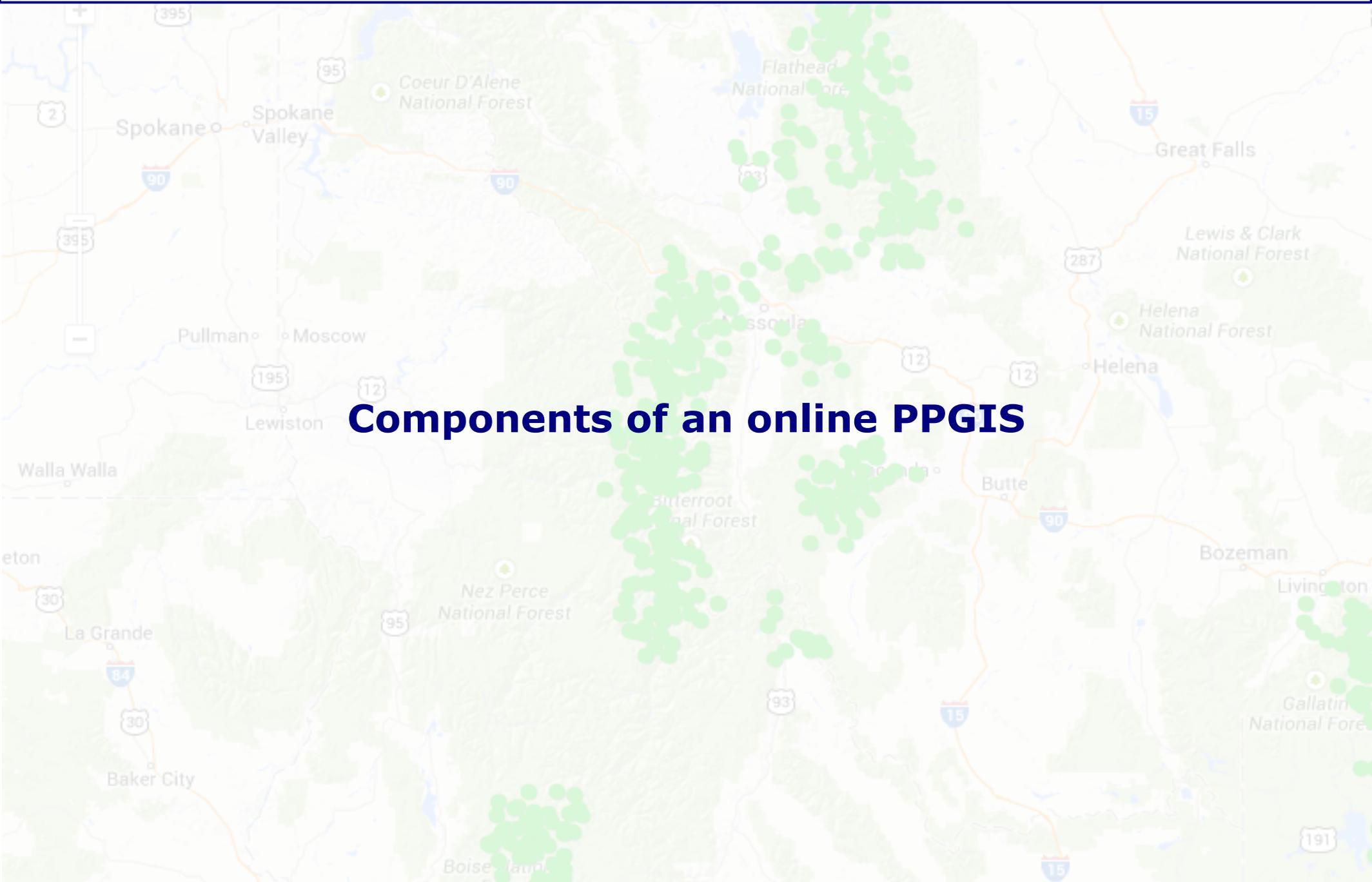
Capture local knowledge and vernacular geographies, by mapping spatial perceptions of the public and the meanings they attach to locations.



## Goals of PPGIS

Include public values in Decision Support Systems.

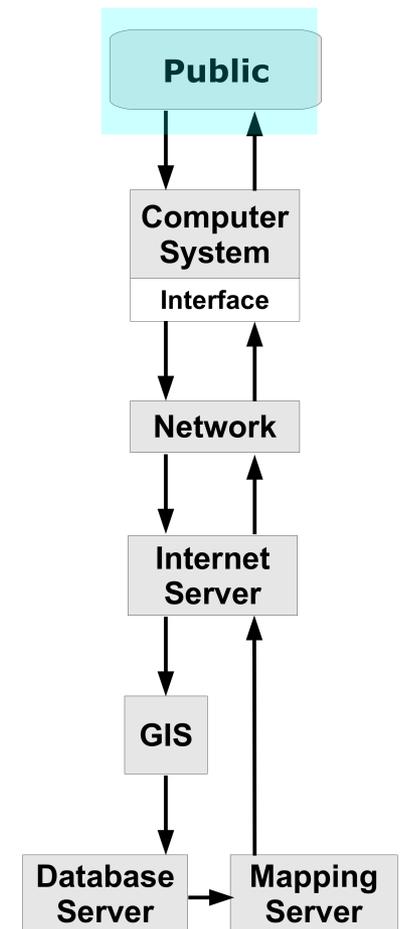




**Components of an online PPGIS**

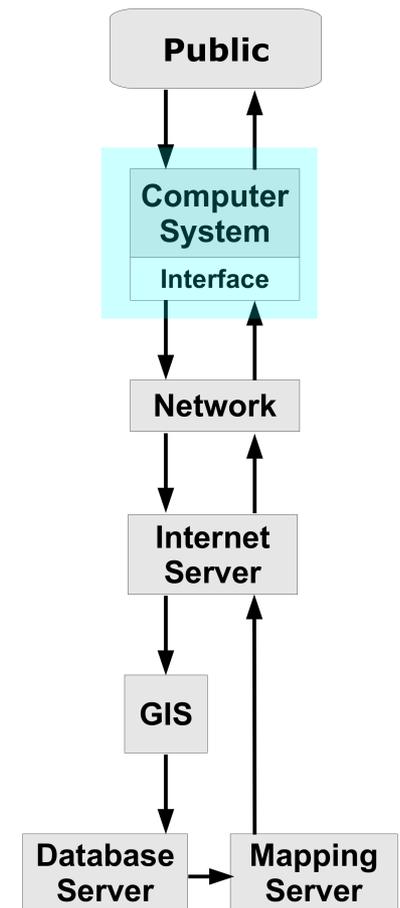
## Components of an online PPGIS: the public

- It is the source of information of PPGIS data.
- As in any survey procedure, it is the respondents who ultimately determine the information quality of the collected data.



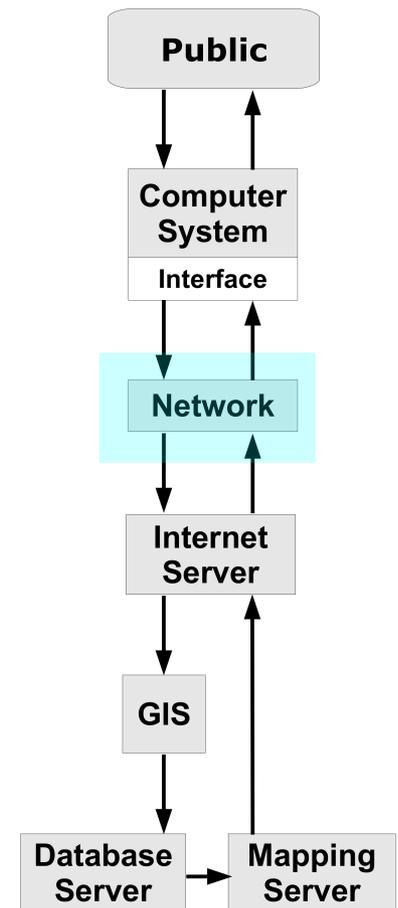
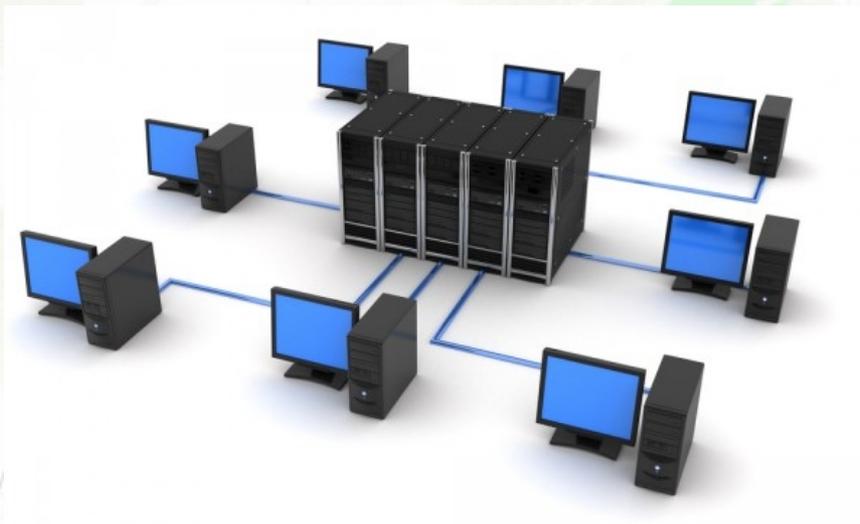
## Components of an online PPGIS: computer

- Consists of a *client* (terminal where data is introduced into the system) and a number of interfaces used for human-machine communication (screen, mouse, keyboard).



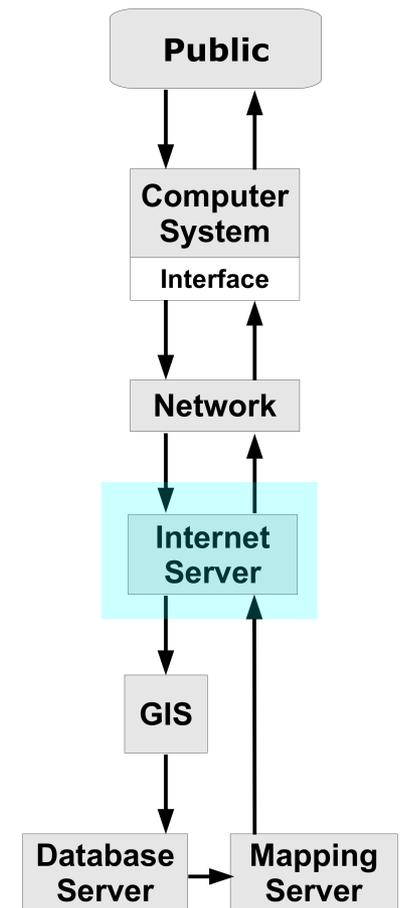
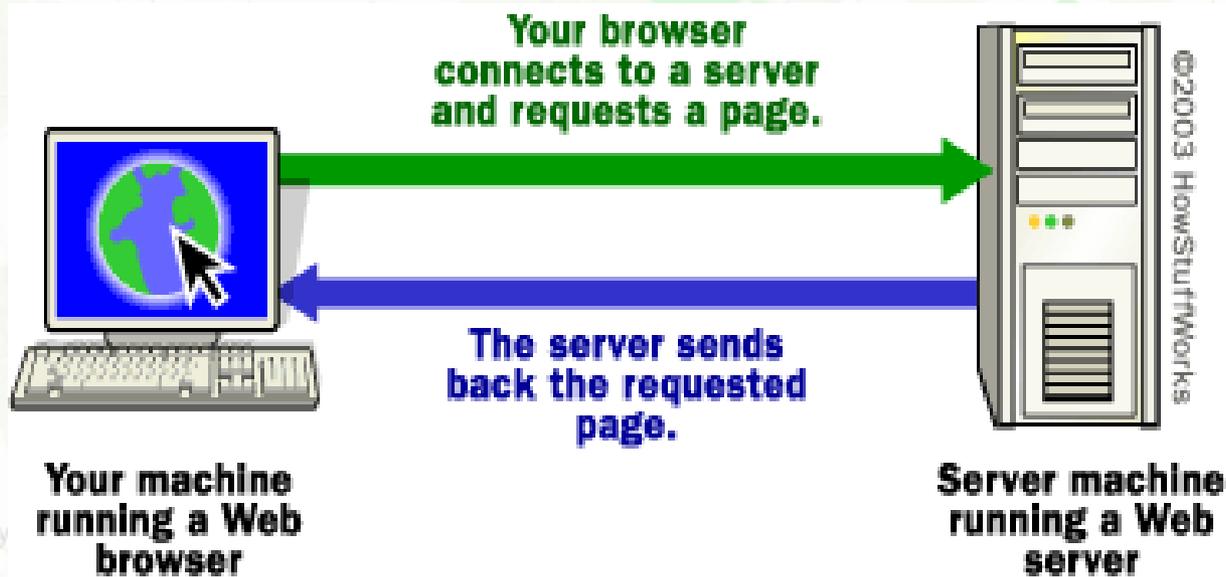
## Components of an online PPGIS: network

- Transmits data through a structure of interconnected computers.
- Not necessarily the Internet (could be a local network).



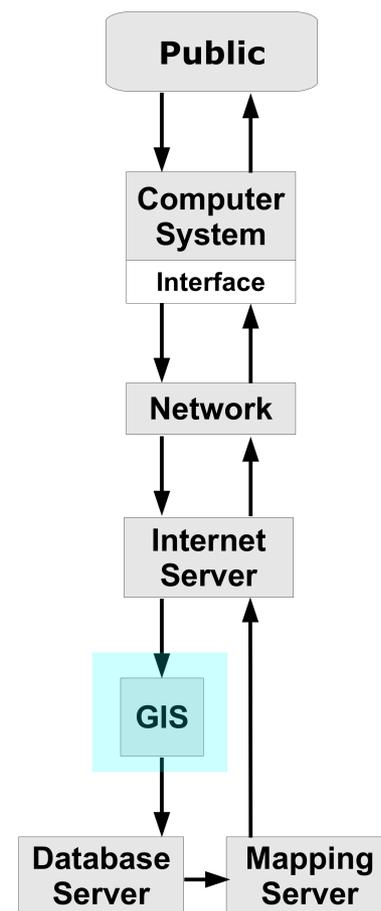
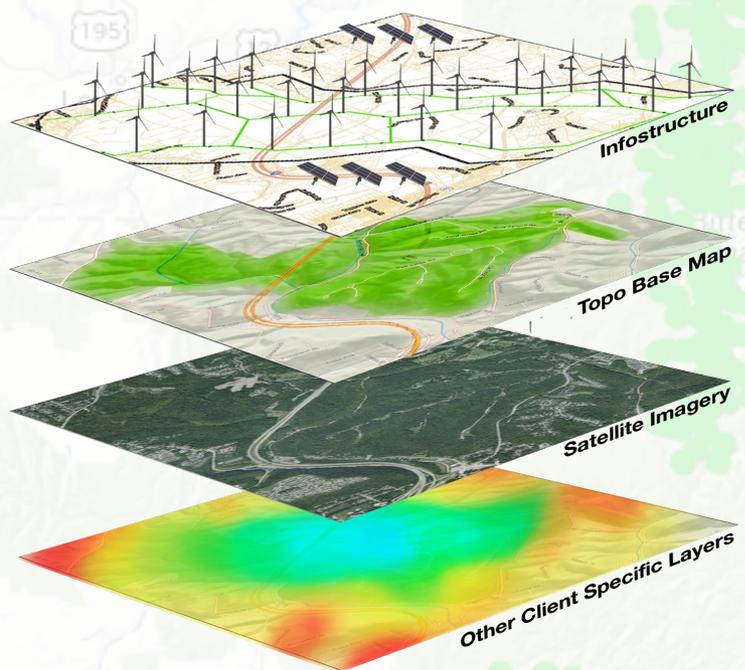
## Components of an online PPGIS: web server

- Receives and delivers web content that circulates through the network.



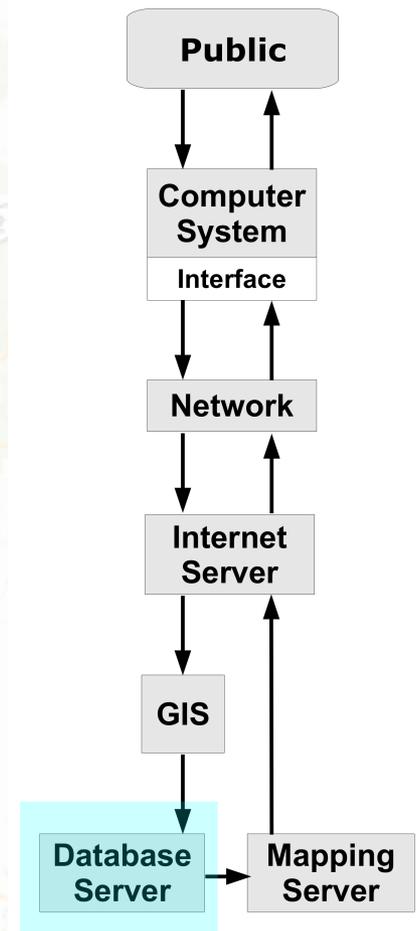
## Components of an online PPGIS: GIS

- Processes both geospatial and non-spatial data to be stored in the database.



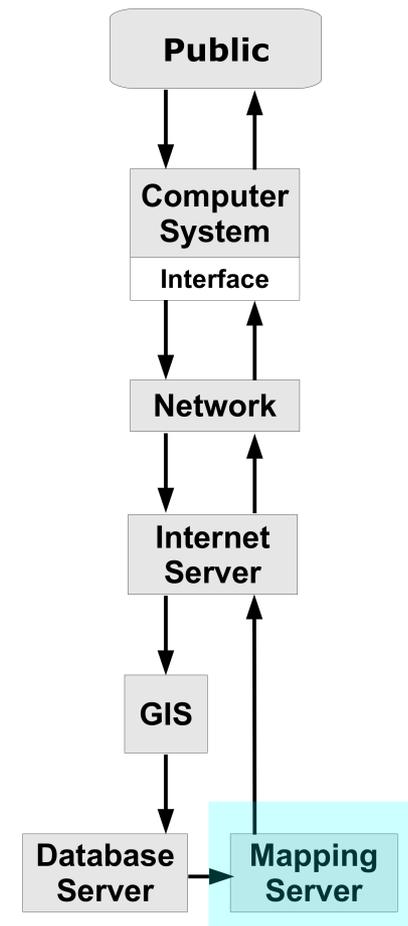
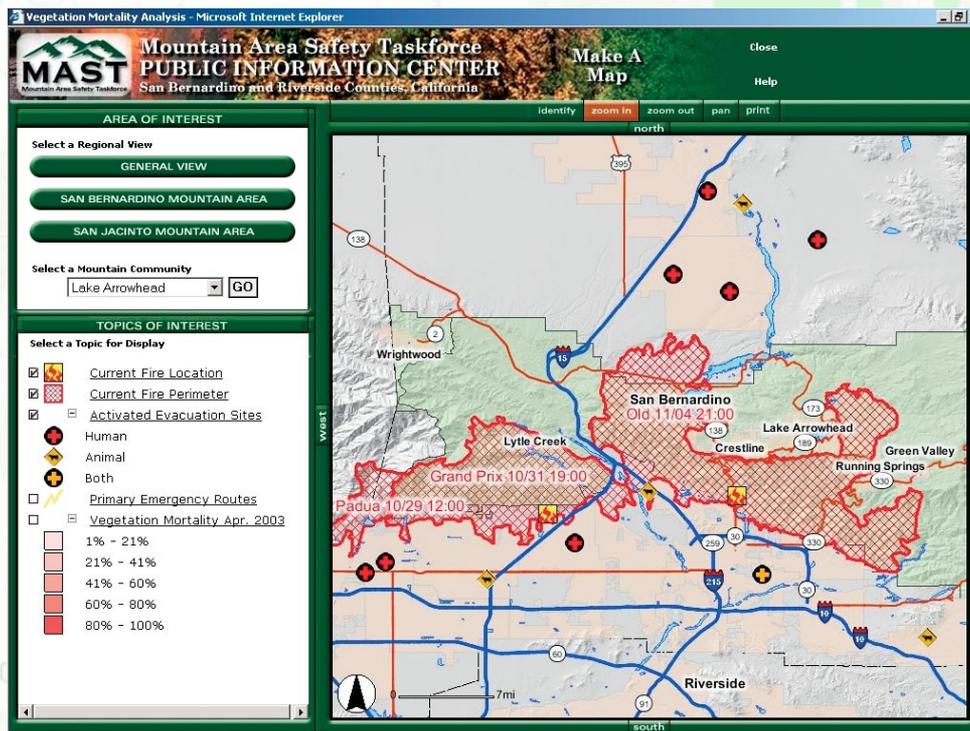
## Components of an online PPGIS: database

- Controls storage, management and retrieval of PPGIS data.



## Components of an online PPGIS: map server

- Controls the display of geospatial data through the network.

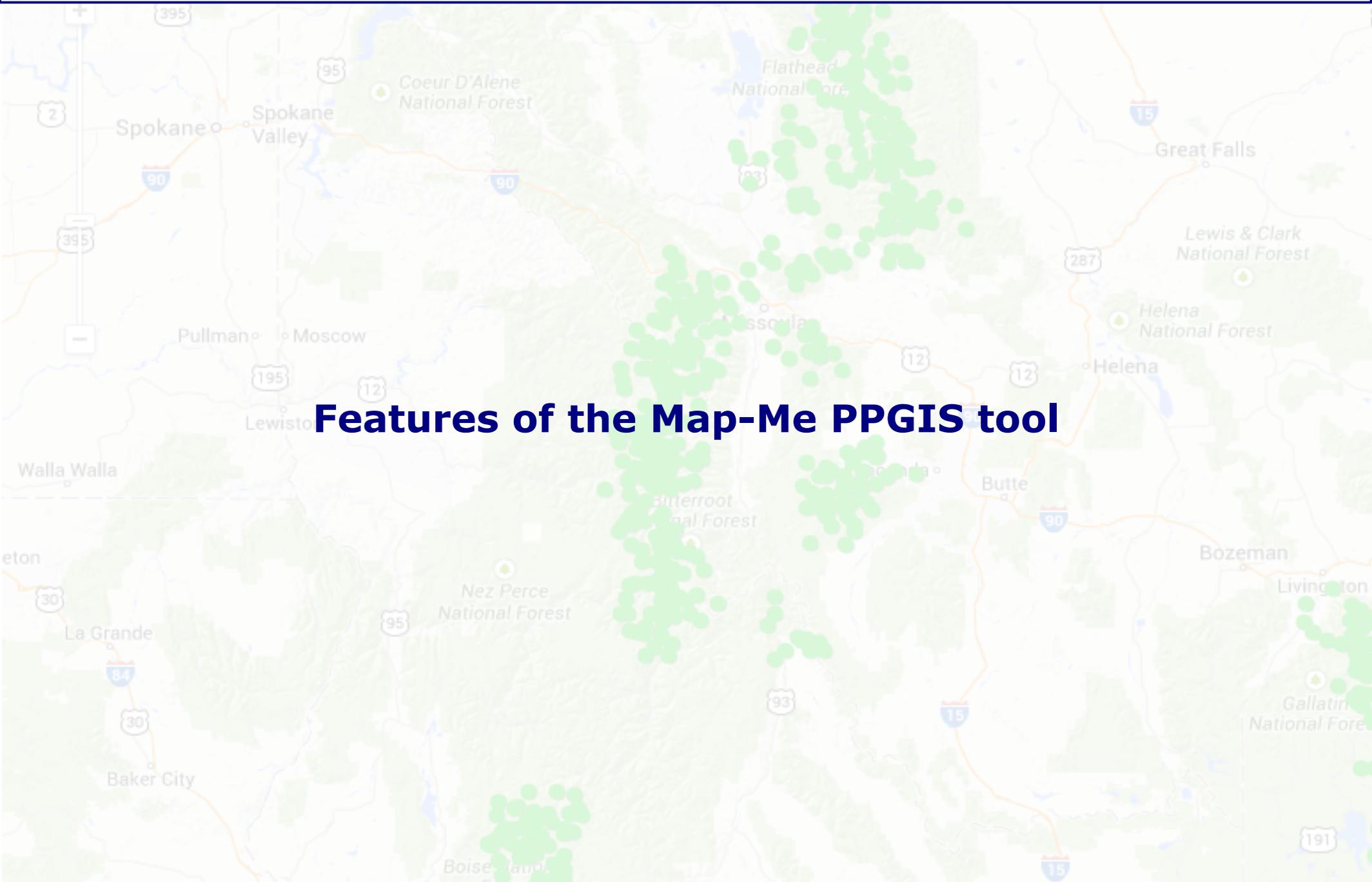


# GEOG5870M: Web-based GIS

## Features and applications of the Map-Me PPGIS

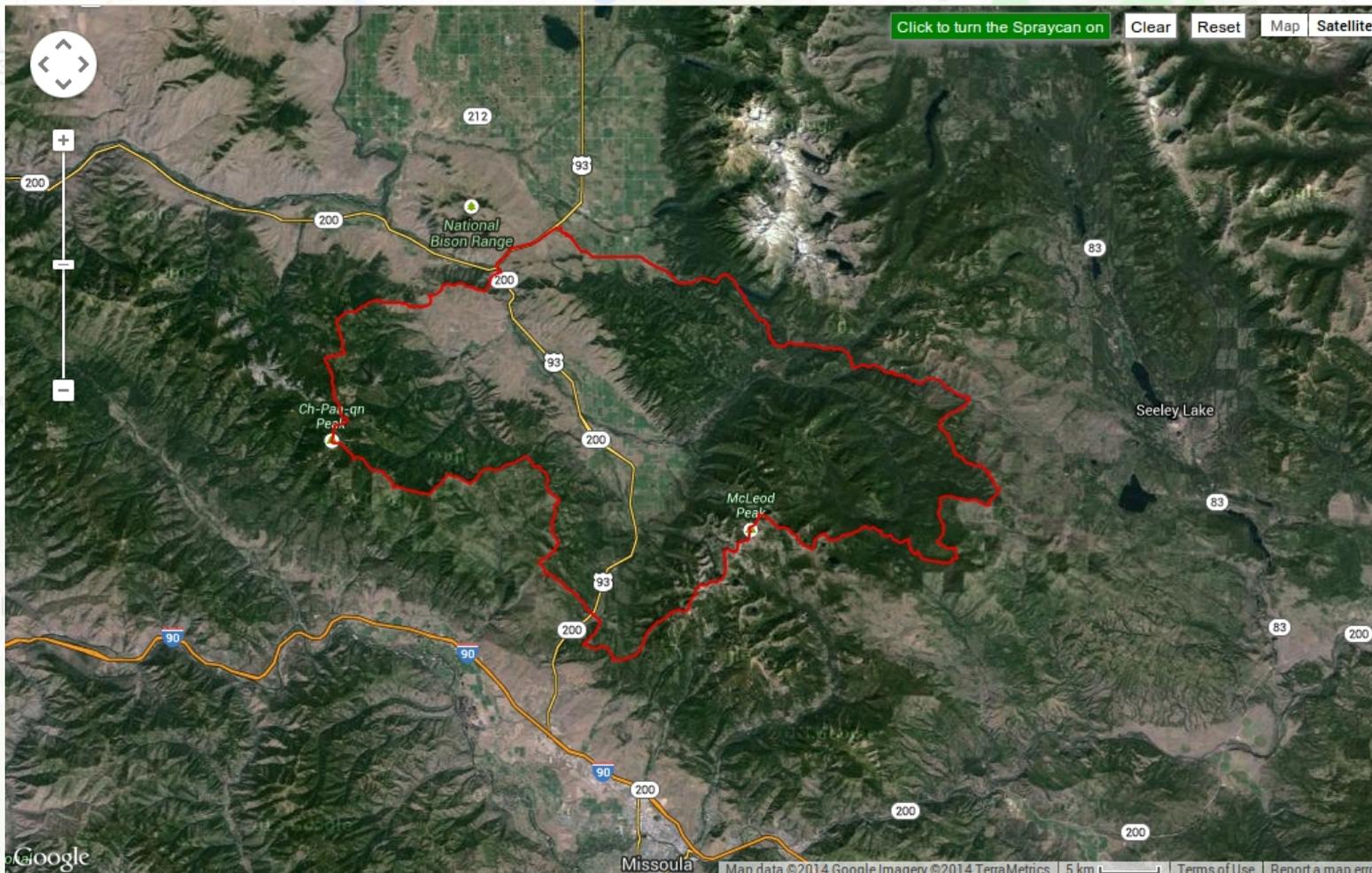


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**Features of the Map-Me PPGIS tool**

## Map-Me interface



**The area outlined in red is the Jocko Landscape. Please indicate an area that you believe has changed over the years.**

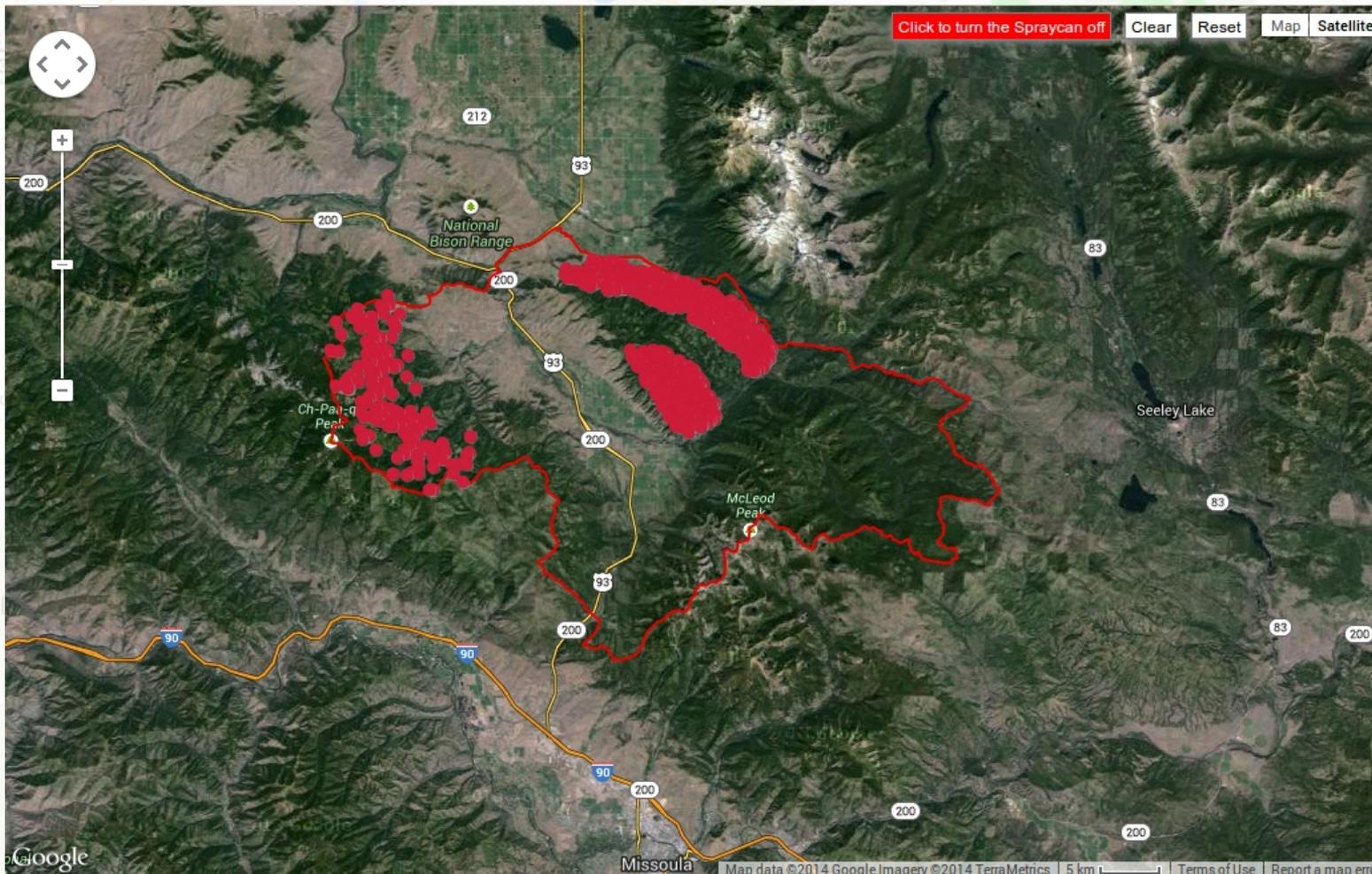
What did this area used to be like and what is the source of your knowledge?

What is the area like now and what do you believe has caused the change from what it used to be like?

What would you like this area to be like in the future and why?



## Fuzzy tagger



The area outlined in red is the Jocko Landscape. Please indicate an area that you believe has changed over the years.

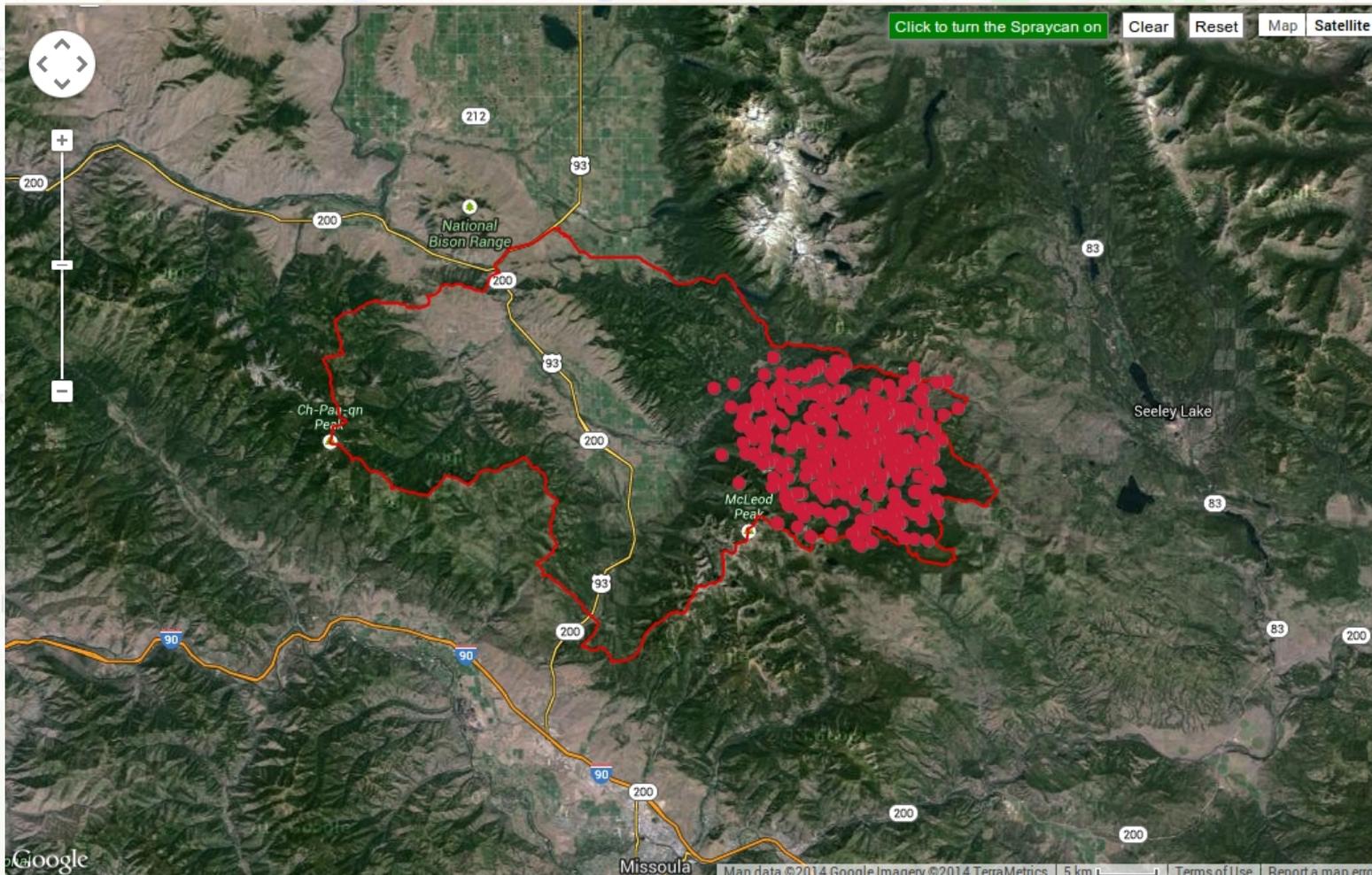
What did this area used to be like and what is the source of your knowledge?

What is the area like now and what do you believe has caused the change from what it used to be like?

What would you like this area to be like in the future and why?



## Location of text data in space



**The area outlined in red is the Jocko Landscape. Please indicate an area that you believe has changed over the years.**

What did this area used to be like and what is the source of your knowledge?

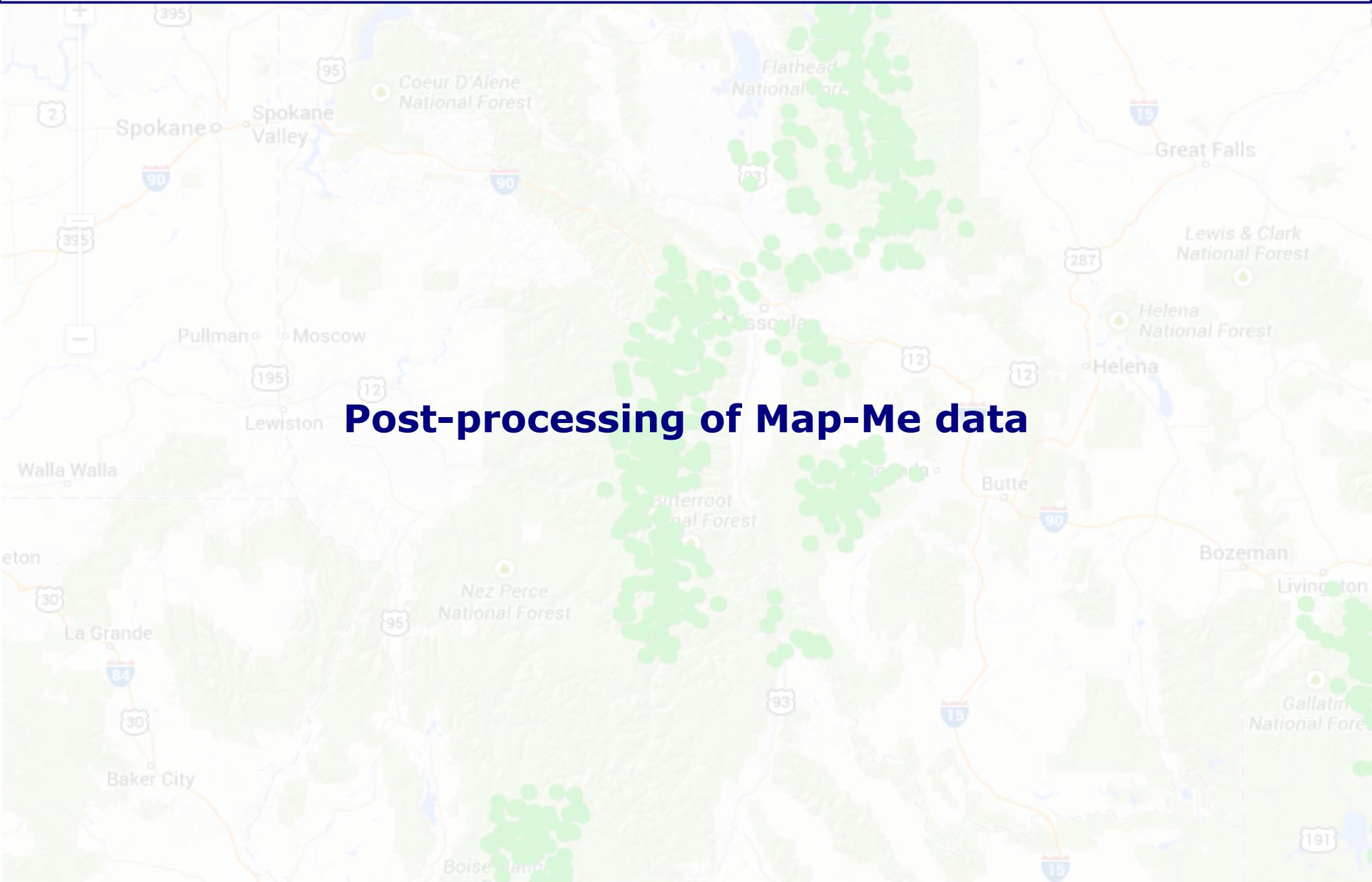
Woodlands used to be much more open. I've been gone to this place since the 1960's. Also from Elders

What is the area like now and what do you believe has caused the change from what it used to be like?

Oversized forest. Closed canopy. Unhealthy. They have to thin.

What would you like this area to be like in the future and why?

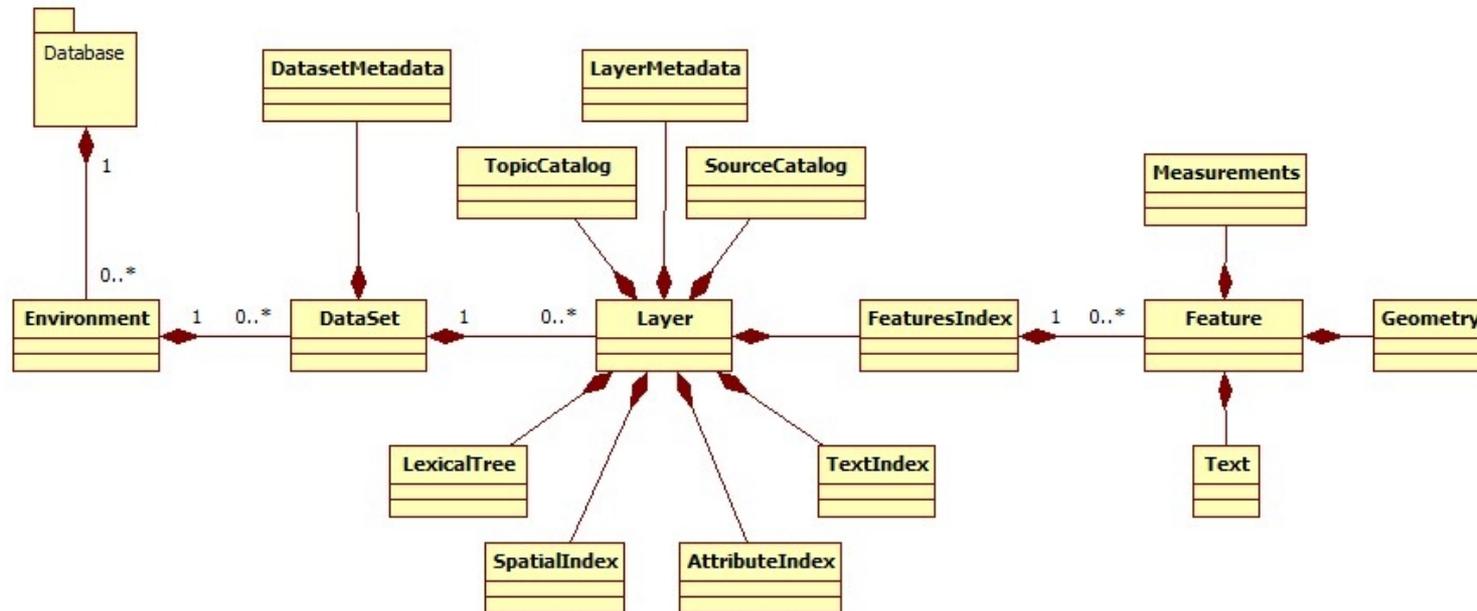
Thinned forest, for fauna and flora to be in equilibrium. That's how it used to be.



**Post-processing of Map-Me data**

## Data organization: the composite database model

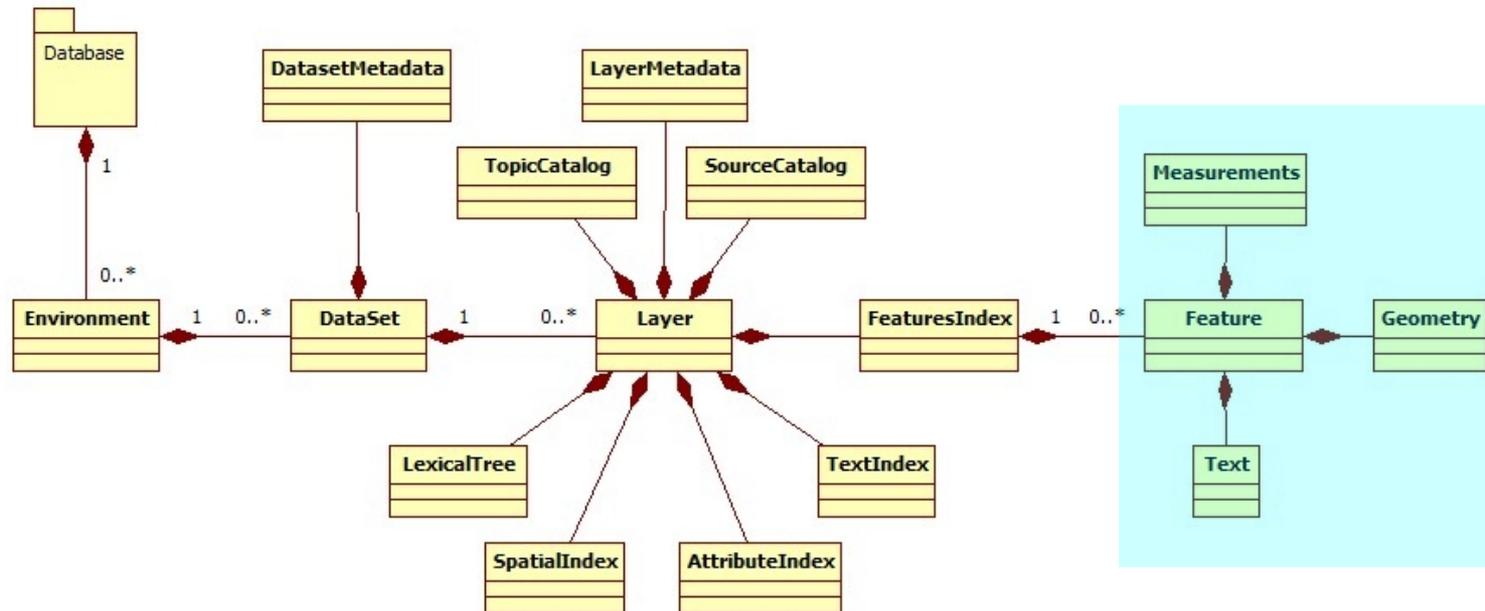
An Object-Oriented database is suitable for dealing with the complexity and heterogeneity of PPGIS features.





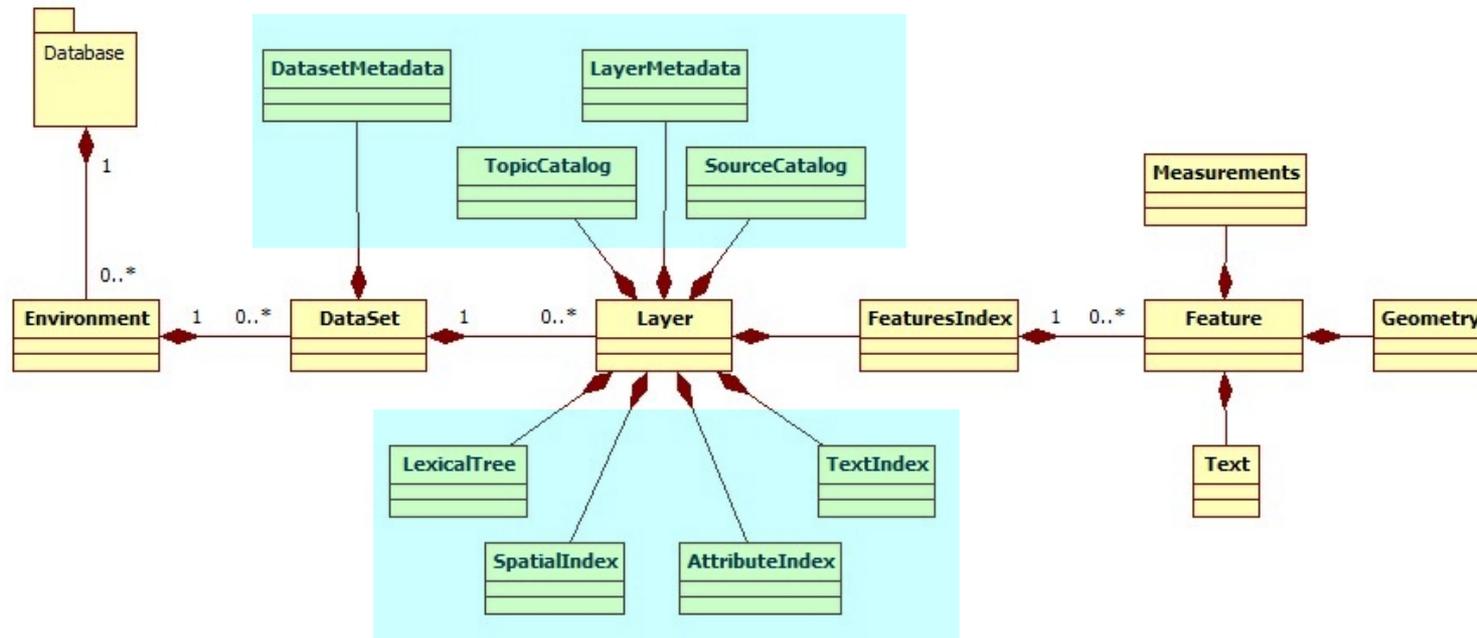
## Data organization: the composite database model

PPGIS features may comprise composite data vectors with spatial, temporal, measure and text components.



## Data organization: the composite database model

Additional modules take on functionality for the improvement of queries of the composite database and the archiving of ancillary information about features.





## **Information retrieval: a naturalized query language**

Natural Language Programming (programming with natural language expressions, e.g. standard English) provides theoretical principles for the synthesis, retrieval, mapping and management of composite data vectors, also facilitating query formulation.

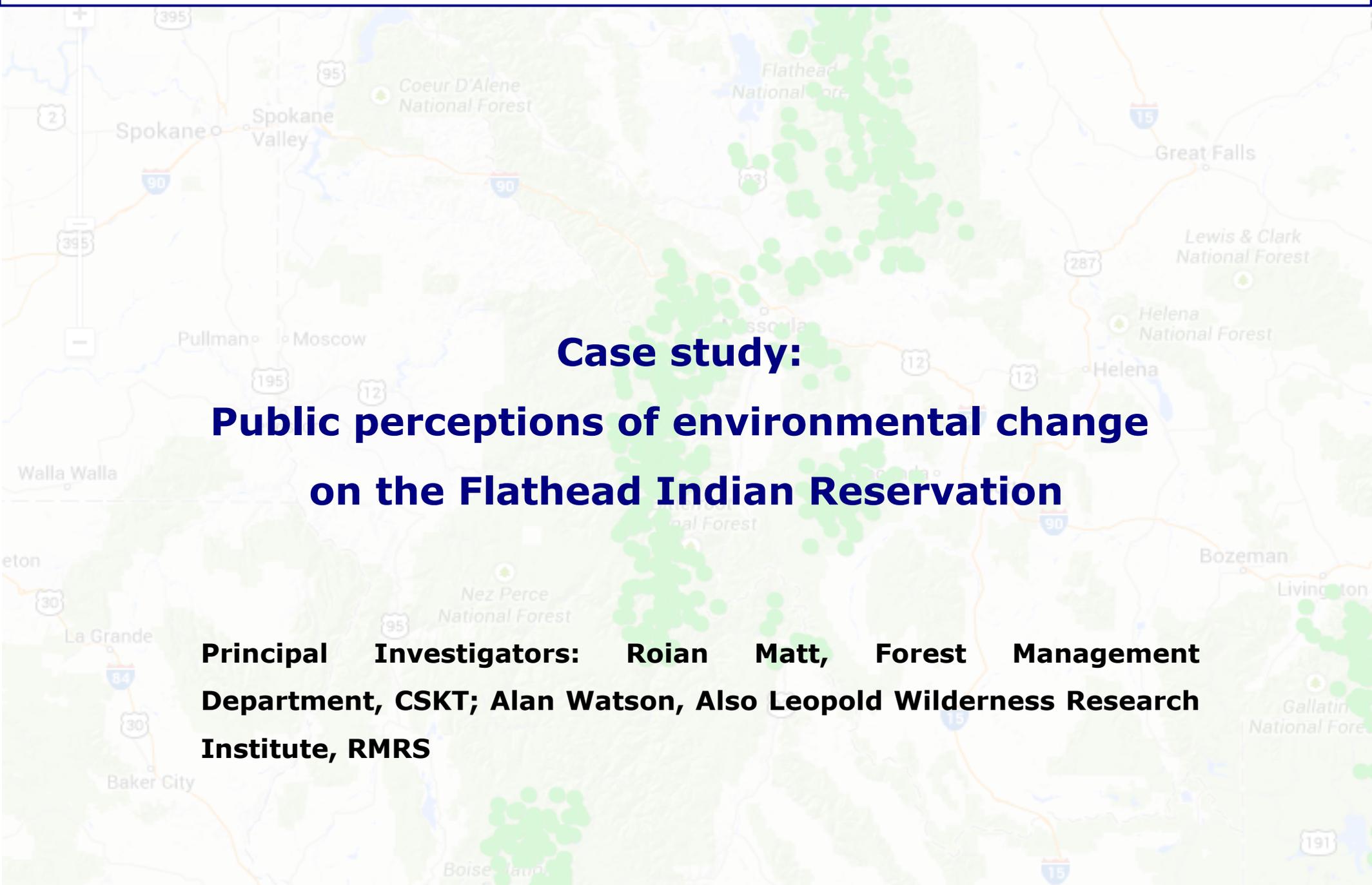
```
select features from layer 2013 in dataset tpk where text  
has noun pine or a synonym,  
then map them as overlays with these parameters: xres as 100  
and yres as 100
```



## **Information retrieval: a naturalized query language**

Natural Language Processing turns out suitable for the interpretation and patterning of human language text data by means of fully- or partially automated mechanisms.

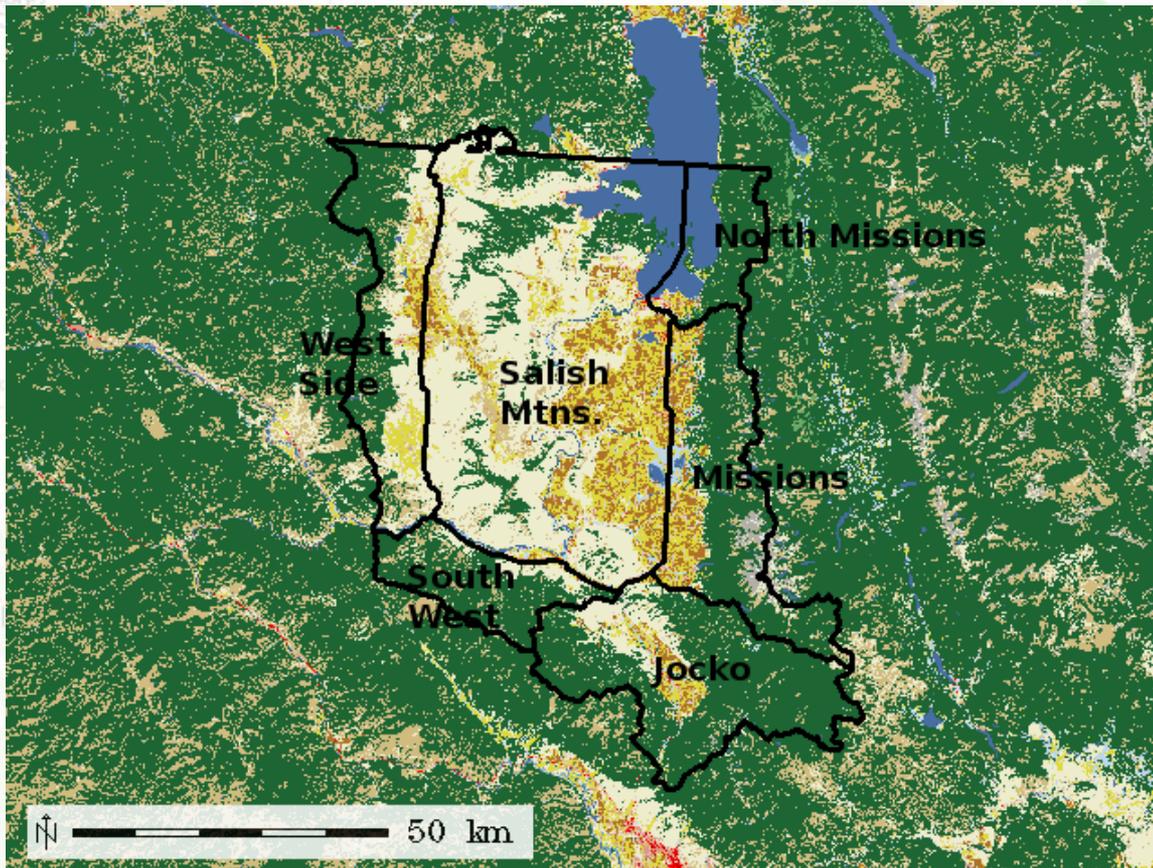
```
select features from layer 2013 in dataset tpk where text  
implies that use of fire has good effects on forests
```

A map of Idaho showing the locations of survey points for the case study. The points are represented by green dots of varying sizes, clustered primarily in the central and eastern parts of the state, particularly around the Flathead Indian Reservation and the Helena area. Major cities like Spokane, Pullman, Moscow, Boise, and Helena are labeled, along with various national forests and highways.

**Case study:**  
**Public perceptions of environmental change**  
**on the Flathead Indian Reservation**

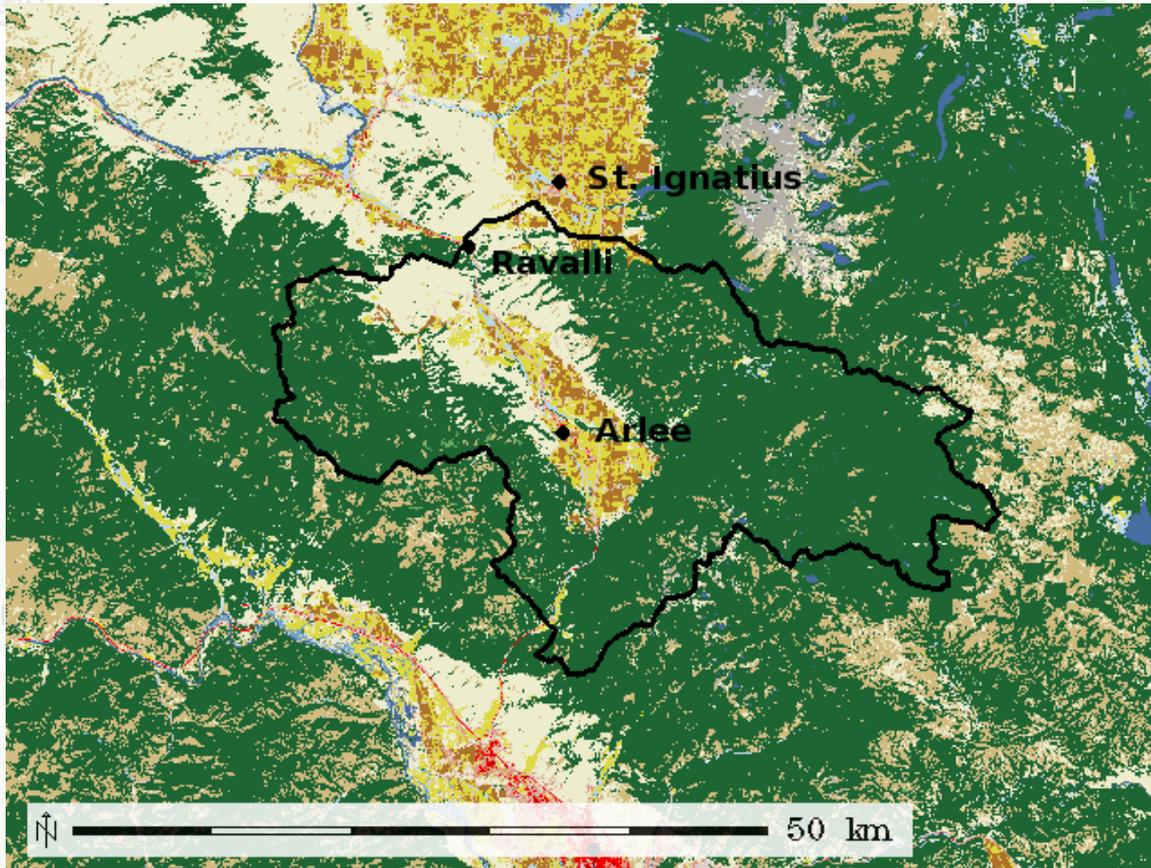
**Principal Investigators: Roian Matt, Forest Management Department, CSKT; Alan Watson, Also Leopold Wilderness Research Institute, RMRS**

## Landscape units on the Flathead Reservation



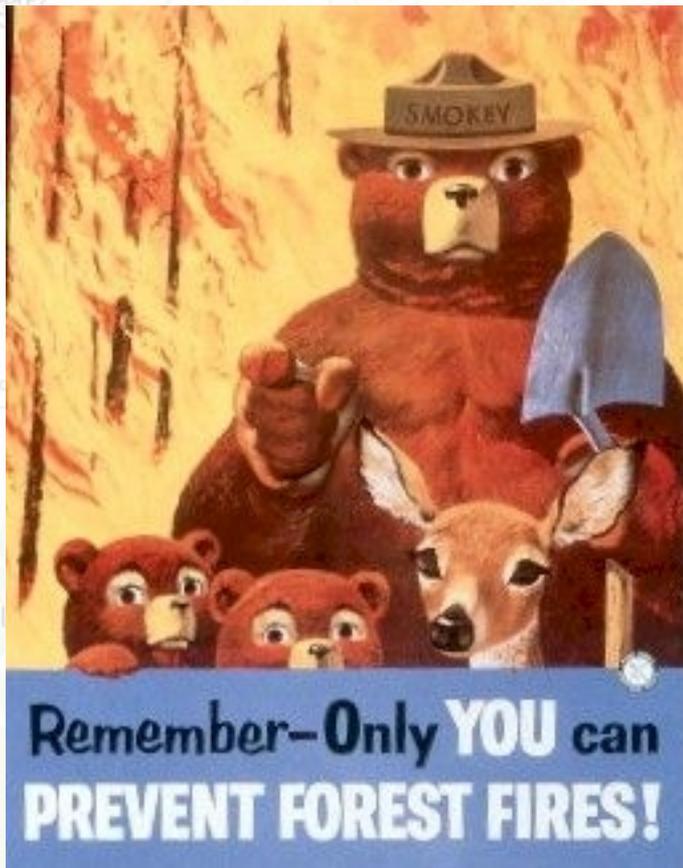
- Northwest Montana.
- Confederated Salish and Kootenai Tribes of the Flathead Reservation.
- Composed of portions of Lake, Sanders, Missoula and Flathead counties.

## The Jocko landscape unit



- Southernmost unit on the Reservation.
- ~ 700 people (CDP's of Arlee and Ravalli).
- Mostly ranges and woodlands surrounding the valley of the Jocko River.

**Issue: has fire suppression had a negative effect on the fire-adapted ecosystems of the Mission mountains?**



- Over the 20<sup>th</sup> century use of fire was largely banned in forests of the USA in order to prevent the effects of fire hazards.
- As a consequence, traditional techniques of prescriptive fire are no longer common practice on the Reservation.

## Effects of fire suppression



- Oversized tree communities.
- Anomalous accumulations of dead wood on the forest floor.
- Dense understoreys of brush and young trees.
- Closed forest canopies.

## Effects of fire suppression



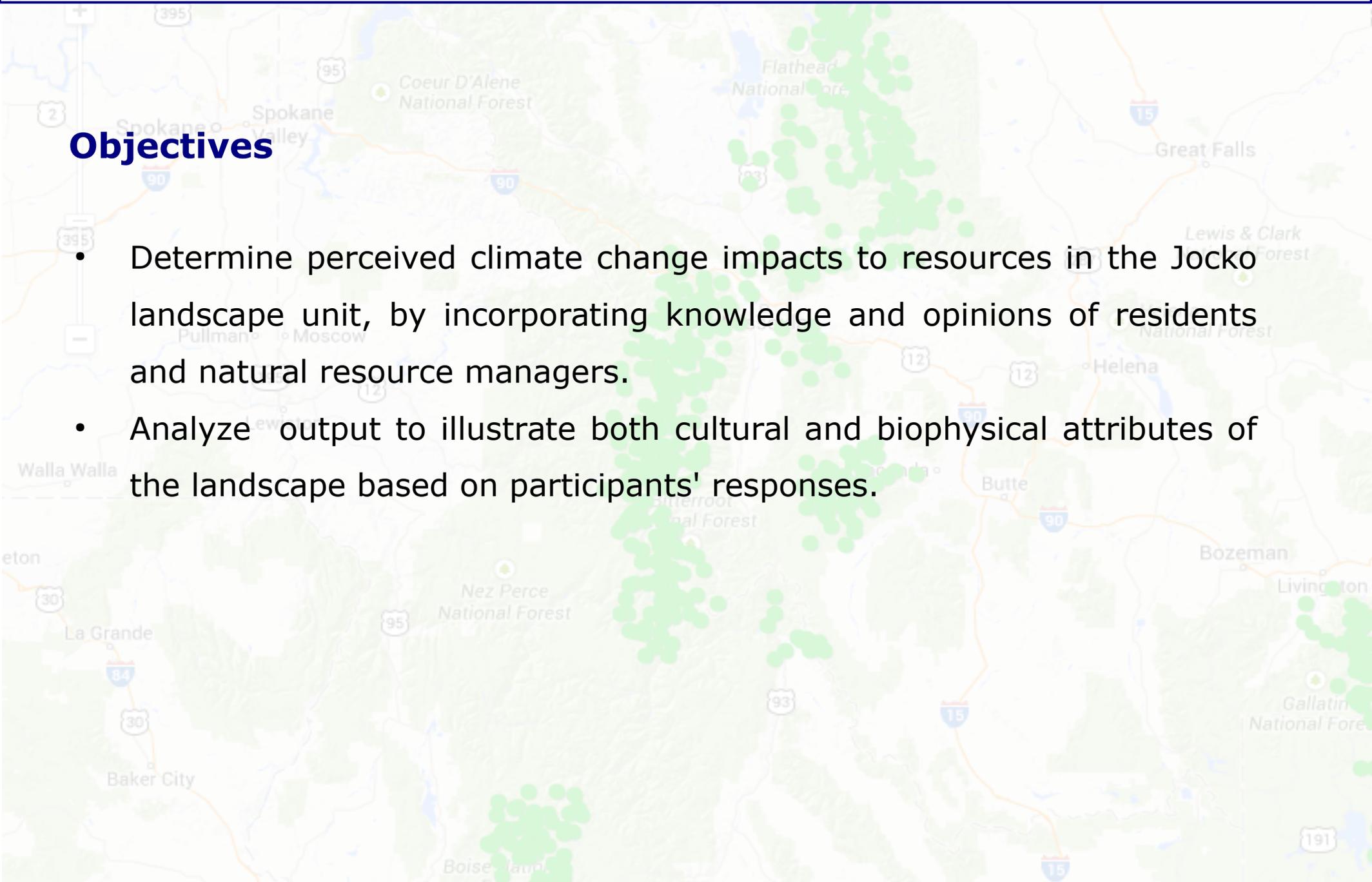
- Susceptible to destructive wildfires.
- Reduction of soil moisture.
- Decrease in sunlight to the forest floor.
- Proliferation of plant pathogens and disease.





## Objectives

- Determine perceived climate change impacts to resources in the Jocko landscape unit, by incorporating knowledge and opinions of residents and natural resource managers.
- Analyze output to illustrate both cultural and biophysical attributes of the landscape based on participants' responses.



## Map-Me PPGIS survey



Click to turn the Spraycan off Clear Reset Map Satellite

Ch-Pan-qn Peak  
McLeod Peak  
Seeley Lake

Map data ©2014 Google Imagery ©2014 TerraMetrics 5 km 200 Terms of Use Report a map error

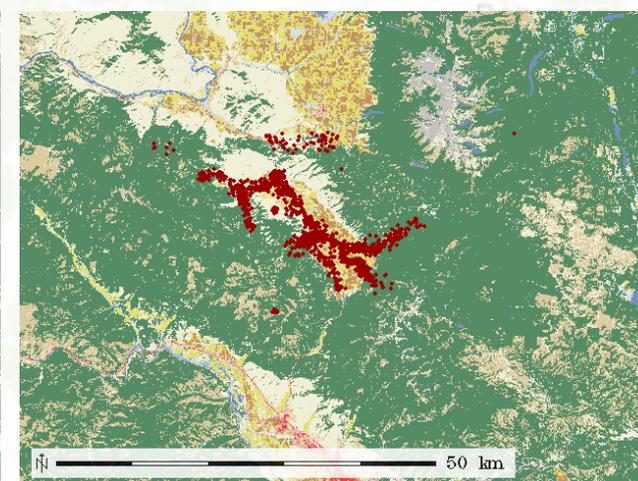
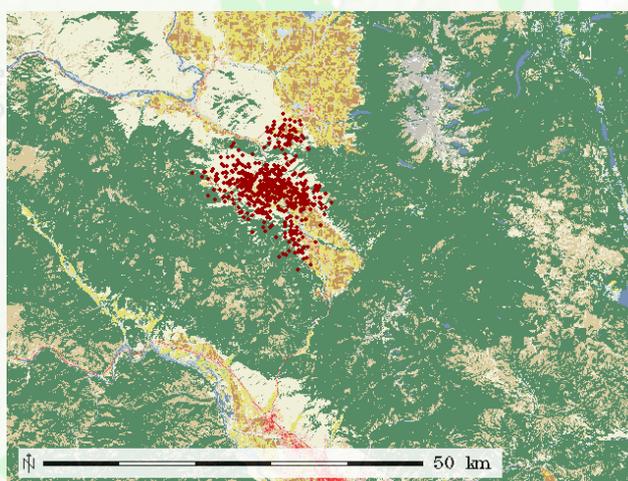
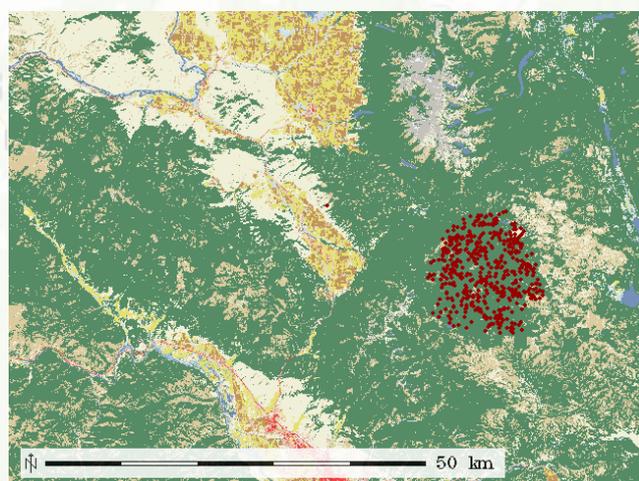
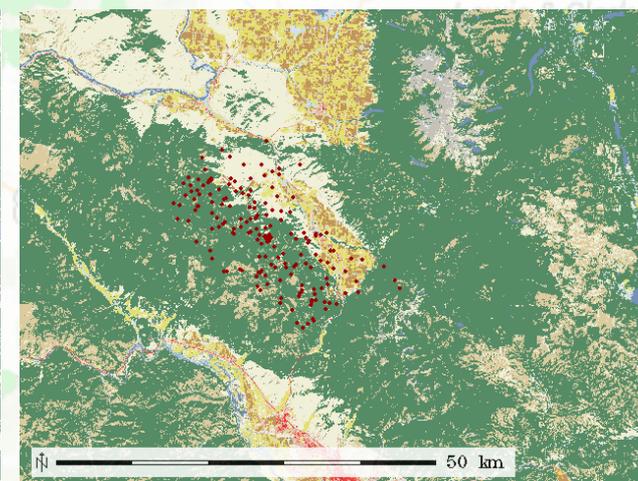
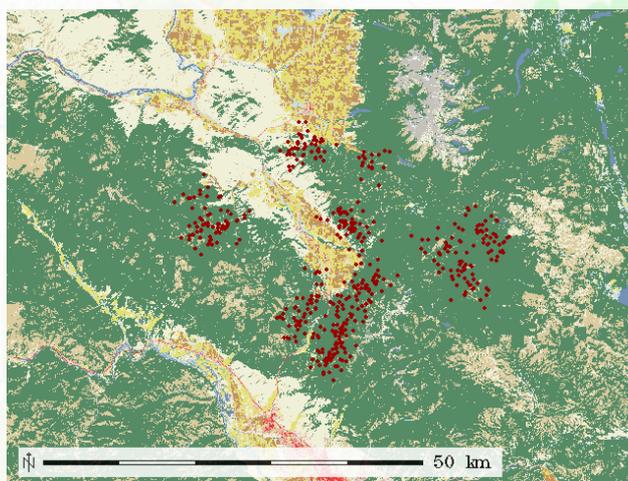
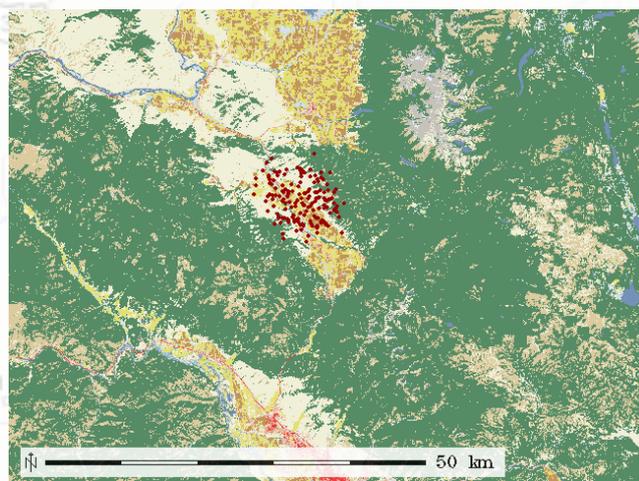
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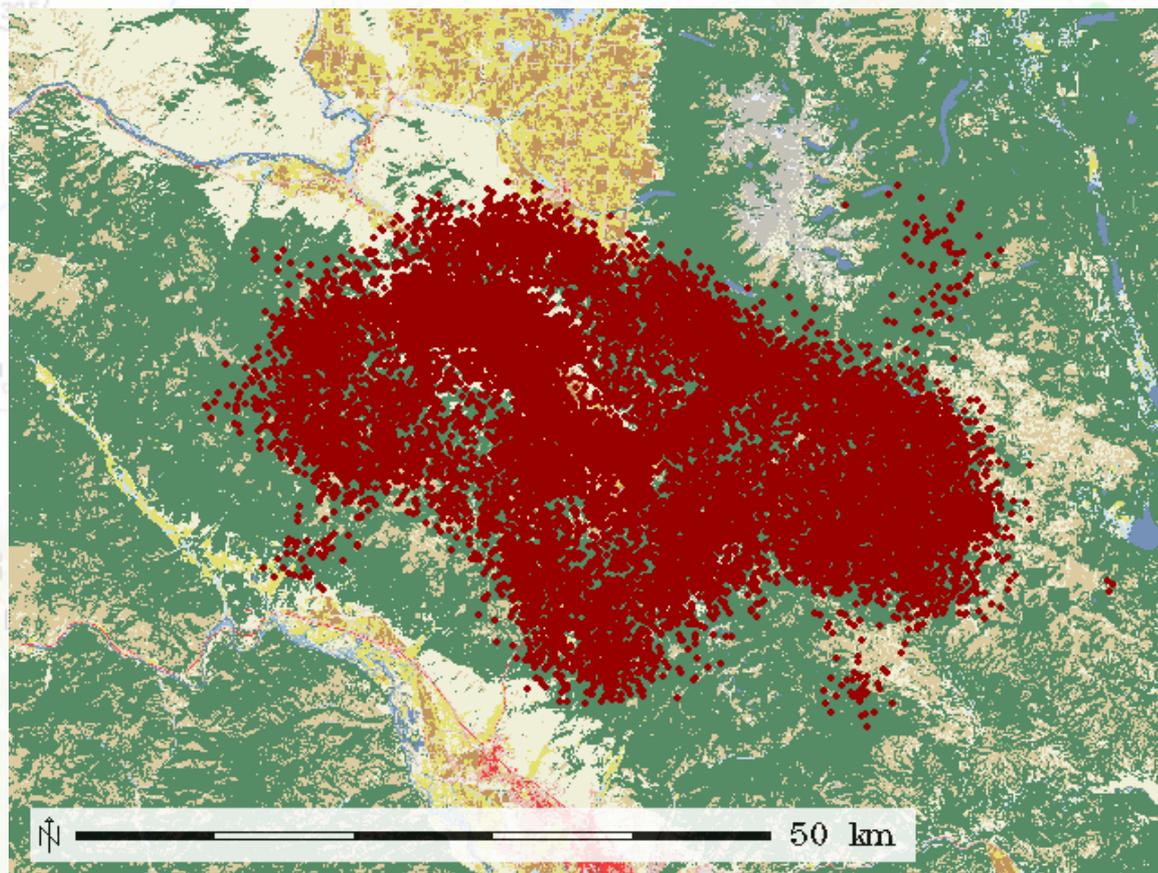
What is the area like now and what do you believe has caused the change from what it used to be like?

What would you like this area to be like in the future and why?

**Spray patterns locating environmental changes in the last decades (some individual responses)**

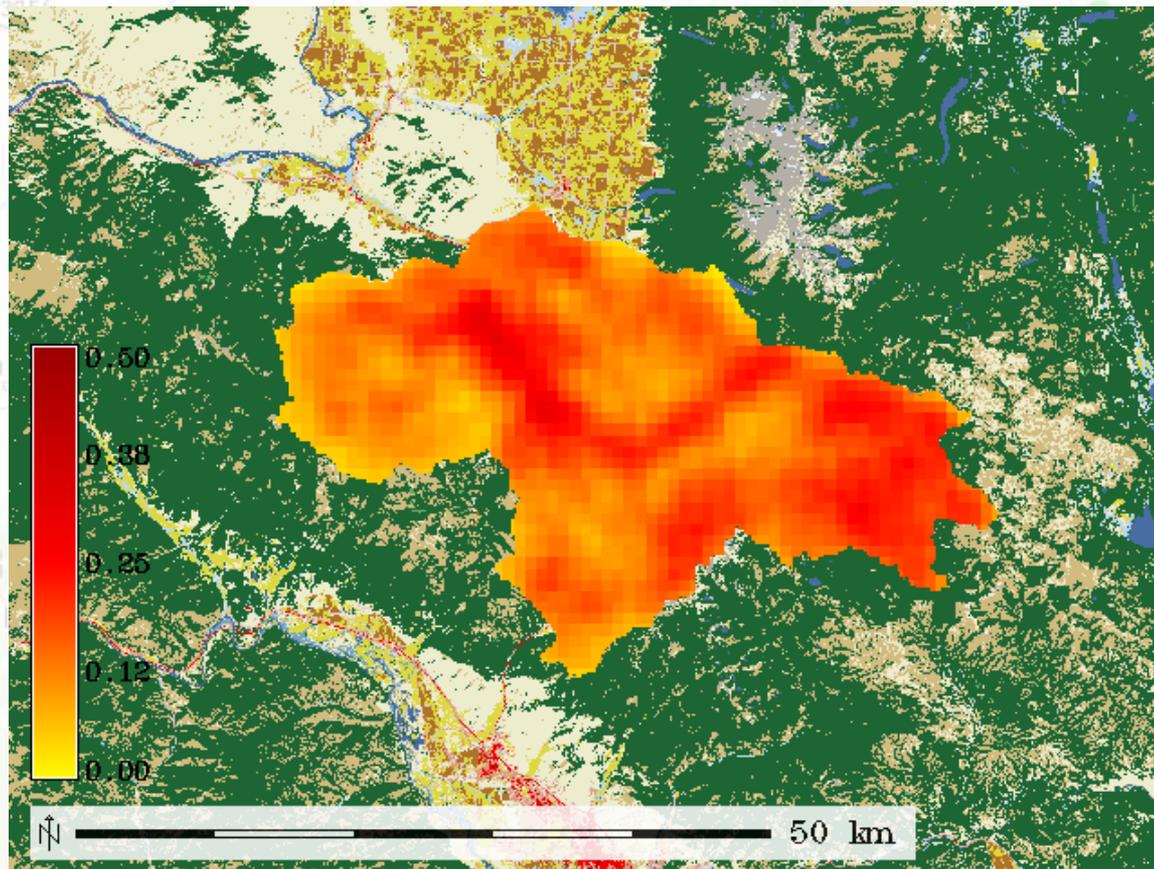


## **Spray patterns locating environmental changes in the last decades (all)**



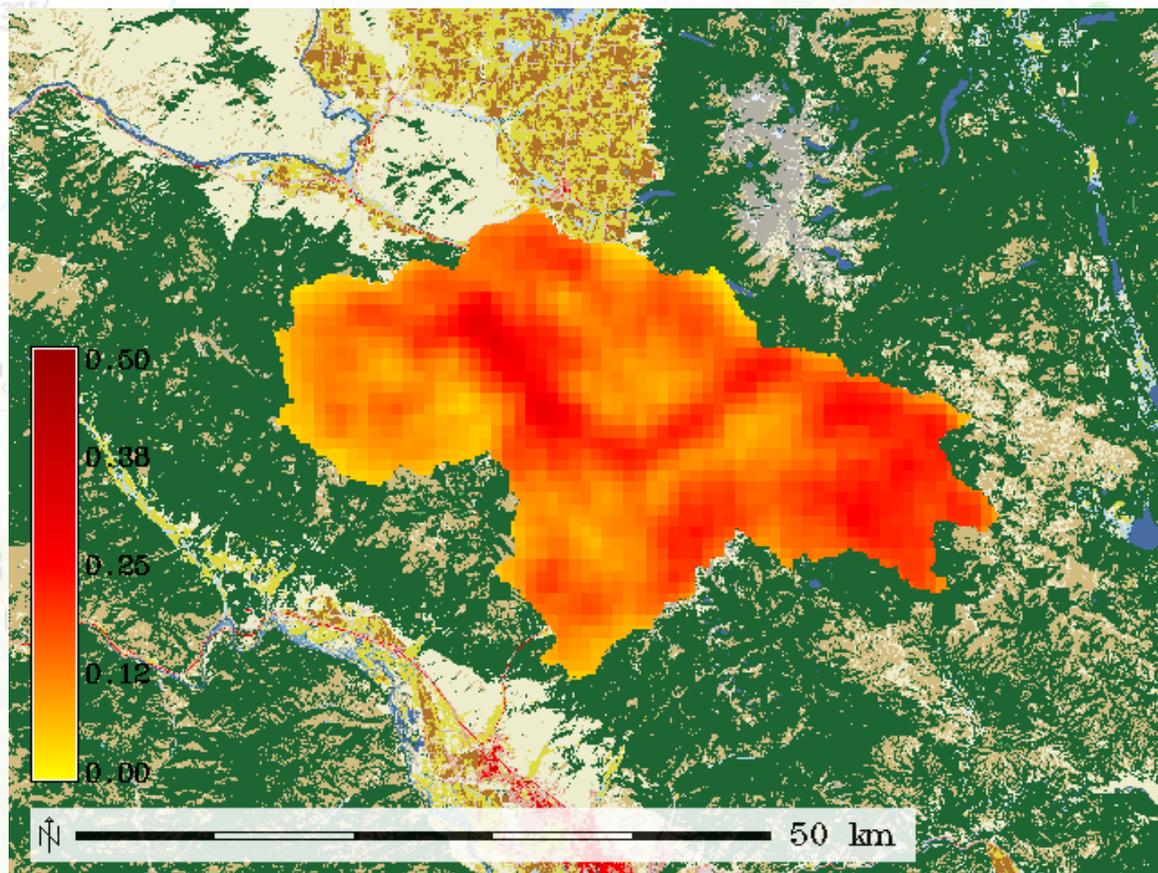
- More than 20,000 single blobs.
- 40 comments providing details about specific environmental changes.
- 29 spray patterns (so 11 comments were given without locations being tagged).

**How frequently in the survey is every location tagged as a place that has undergone recent environmental changes?**



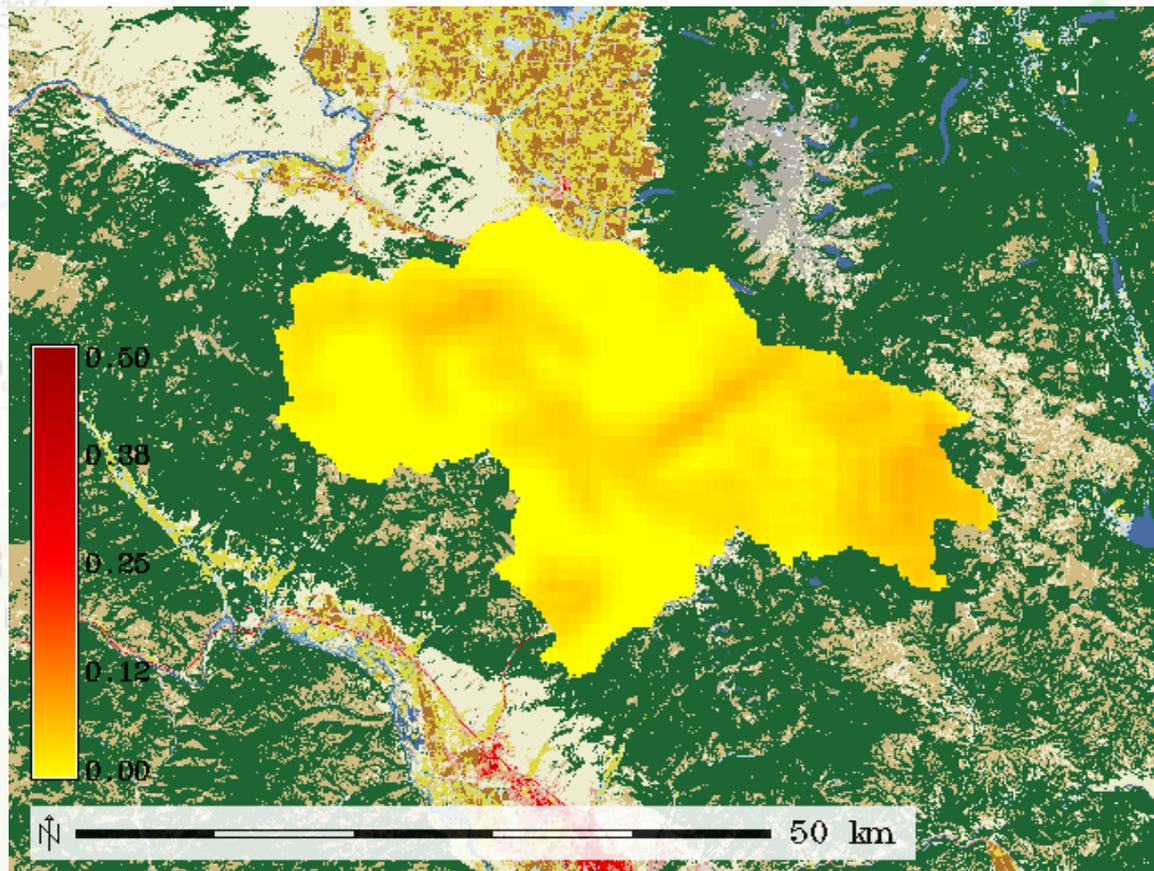
- Cell value =  $\frac{\text{Number of overlapping spray patterns}}{\text{Total number of spray patterns}}$ .
- Maximum number of overlapping spray patterns in a given location is 36 % of total number of spray patterns.

**How frequently in the survey is every location tagged as a place that has undergone recent environmental changes?**



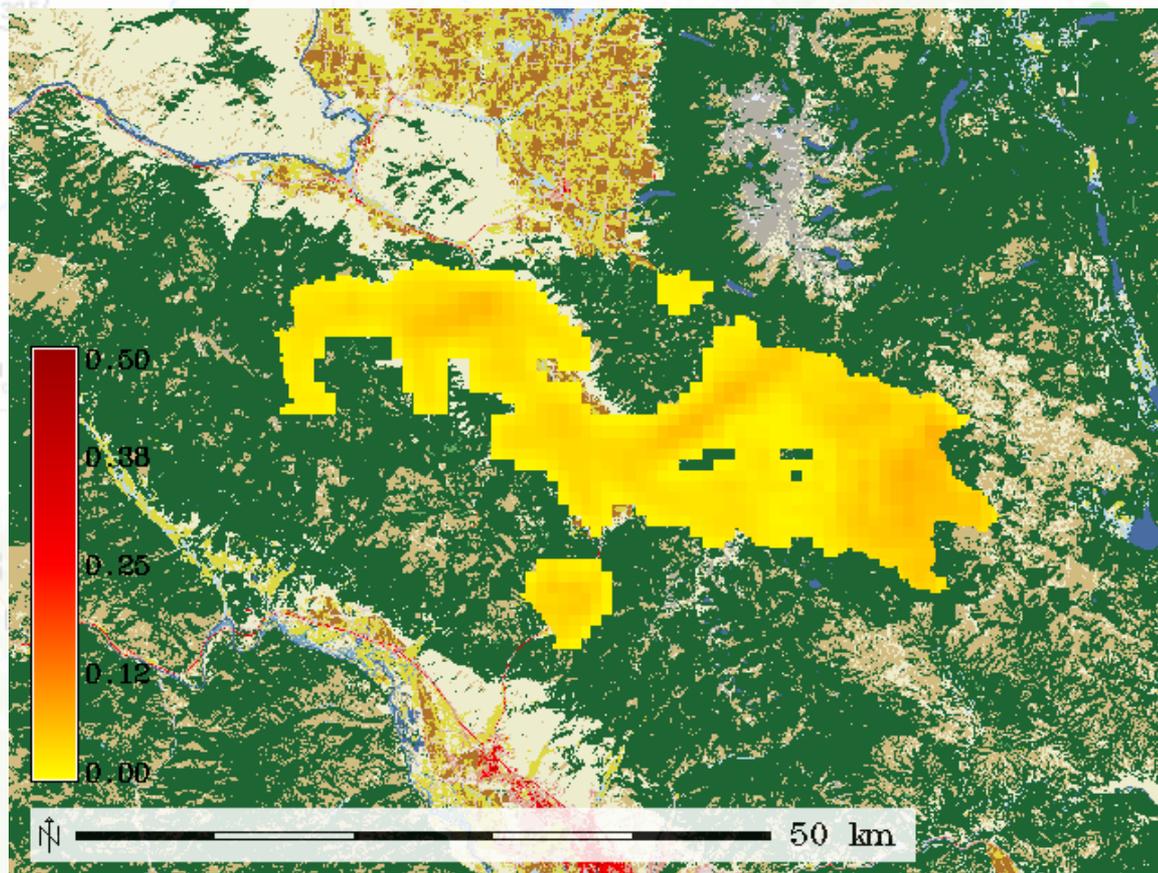
- Places where interviewees agree in having observed changes concentrate along the Jocko river and in the primitive area of the Mission Mountains.

## How frequently do tagged places have comments supporting *in situ* use of prescribed fire?



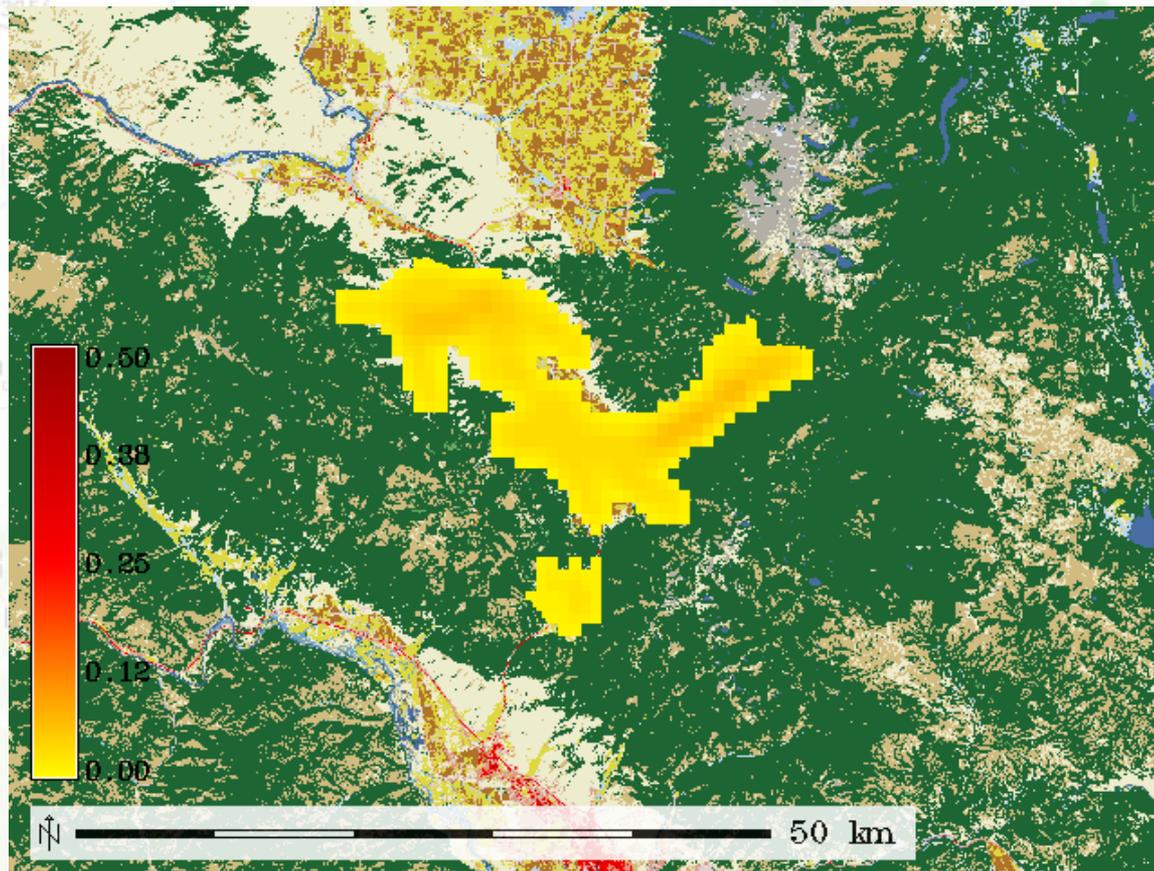
- 31 % of spray patterns support the use of prescribed fire in tagged spots.
- Maximum number of overlapping spray patterns in a given location is 12 % of all spray patterns.

## How frequently do tagged places have comments supporting *in situ* use of prescribed fire? (frequency > 0)



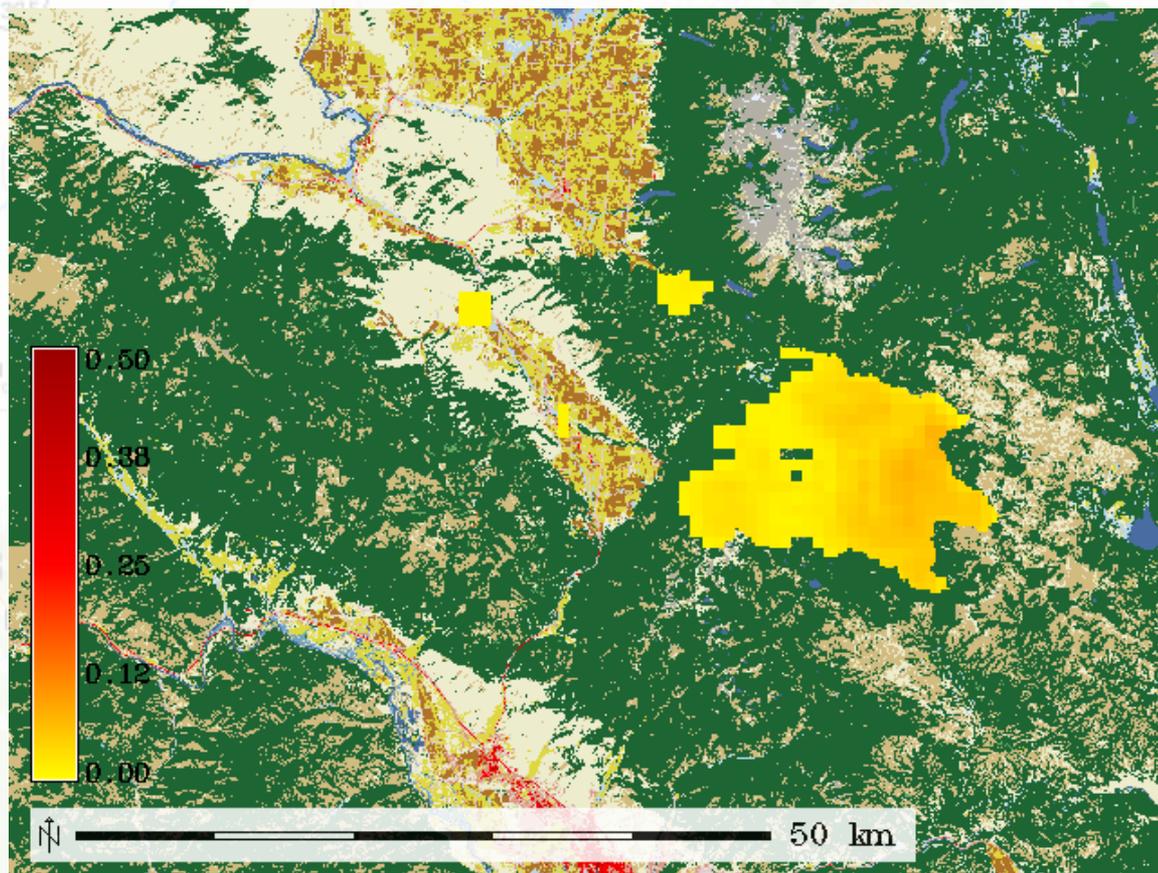
- 31 % of spray patterns support the use of prescribed fire in tagged spots.
- Maximum number of overlapping spray patterns in a given location is 12 % of all spray patterns.

## How frequently do tagged places have comments supporting *in situ* use of prescribed fire? (non tribal)



- Spots most frequently tagged by non-tribal people concentrate along the Middle Jocko and in herbaceous lands between the basin and higher woodlands.

## How frequently do tagged places have comments supporting *in situ* use of prescribed fire? (tribal)

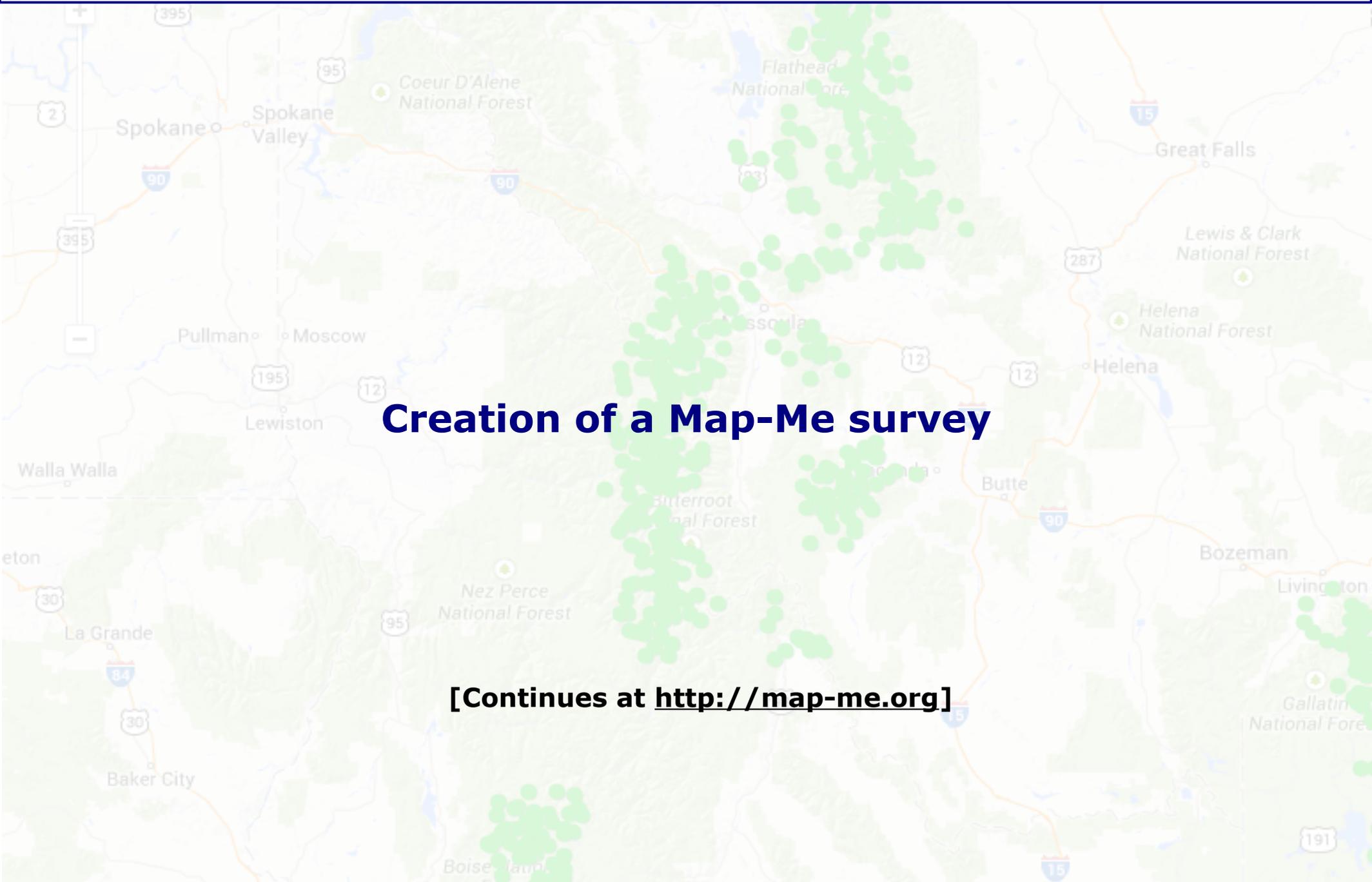


- Spots most frequently tagged by tribal members concentrate in the mountain woodlands and summits of the eastern primitive area.

## Next steps

What is the probability of these spatial associations with specific land-use classes to be the product of chance?

- Testing of randomness hypotheses with:
  - Simulation of random spray patterns.
  - Bootstrapping (reshuffling the allocation of spray patterns to interviewees).
- Analysis of candidate covariates other than land cover (e.g. evolution of fire regimes, land status).
- Testing of substratum effects on the geometry of the spray patterns by spatially-aware regression models.



**Creation of a Map-Me survey**

**[Continues at <http://map-me.org>]**

# GEOG5870M: Web-based GIS

## Features and applications of the Map-Me PPGIS



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Thank you



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