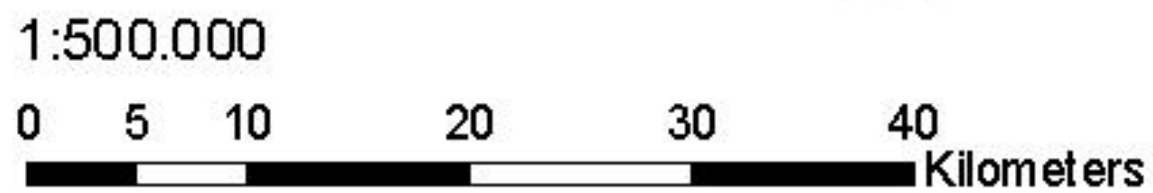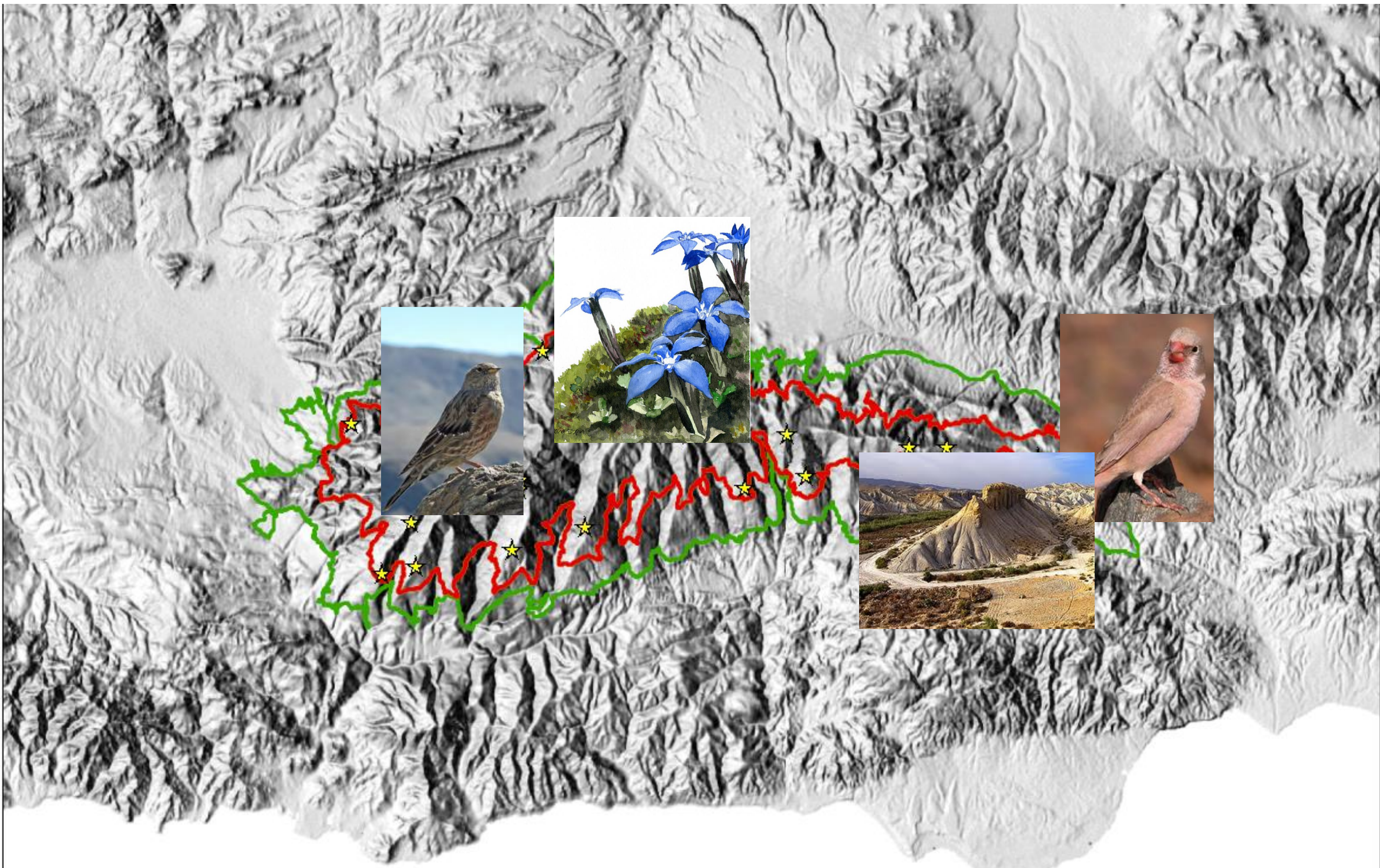Observatorio
Cambio Global
Sierra Nevada

SIERRA NEVADA GLOBAL CHANGE OBSERVATORY.

THE CHALLENGES OF THE CONSERVATION AND MANAGEMENT OF AN EXCEPTIONAL TERRITORY

Blanca Ramos

Conservation Area of Sierra Nevada
National and Nature Parks

Carmen de la Victoria (Granada)
January 29th, 2014

SIERRA NEVADA BIOSPHERE RESERVE

1:500.000

0   5   10   20   30   40
Kilometers

Sierra Nevada global Change Observatory

- Assessment for the conservation, management and recovery of biodiversity and the ecological functions

- Change of paradigm in relation to habitats and species conservation, towards an adaptive management to build or increase **ecosystem resilience**.

- Overall conceptual envelope for current adaptive management strategies and practices in Sierra Nevada Biosphere Reserve and its surroundings, contributing to a sustainable socio-economic development.

- Based on mutual feed back between scientists and managers in search of the best available information, scientifically validated, to improve the knowledge required for that purpose.

THE CHALLENGES

- 80 endemic plant species out of 2.100 species of vascular plants
- Natural forest with Holm Oak (*Quercus ilex* ssp. *ballota*), Pyrenean Oak (*Quercus pyrenaica*) and endemic Scots Pine (*Pinus sylvestris* ssp *nevadensis*) with local patches of *Acer opalus* ssp. *granatensis, Sorbus aria, Salix caprea and Betula fontqueri.*
- High mountain *Juniper* scrublands
- High mountain meadows very rich in endemic plants
- Aquatic systems: high mountain rivers and ponds. El Padul peatland (Ramsar site)
- Restoration of natural areas covered with pine plantations (+ 40.000 ha)
- Restoration and conservation of medieval irrigation system
- Restoration of an area (3.400 ha) affected by a big fire

80 endemic plant species out of 2.100 species of vascular plants

Gentiana alpina

Pinus sylvestris nevadensis

Delphinium nevadense

Ranunculus glacialis

Papaver lapeyrusianum

Arenaria nevadensis

Betula pendula fontqueri

Natural forest with Holm Oak (*Quercus ilex* ssp. *ballota*)

Cáñar Pyrenean Oak forests

Pine plantations

Relic mixed deciduous forests of *Acer opalus* ssp. *granatensis, Sorbus aria, Salix caprea and Betula fontqueri*

High mountain scrubland

High mountain meadows
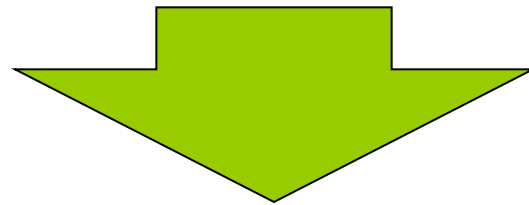
High mountain ponds and lakes

22/MAY/2013

Pine plantations

Monitoring forest management in pine plantations

- Measuring competition

- Not jeopardising edaphogenesis

- Increasing structural diversity (horizontal and vertically)

- Promoting NATURAL REGENERATION

- Promoting species diversity and the evolution of the brushwood

STRUCTURAL AND FLORISTIC DIVERSITY

ECOSYSTEM RESILIENCE

CAPACITYOF PROVIDING ENVIRONMENTAL SERVICES

CONSEJERÍA DE MEDIO AMBIENT

Questions to answer:

✓ Influence of treatment intensity (% clearance) on the evolution of the area in relation to:

- Growing rate of main species
- Regeneration of main species
- Recruitment of other species and increasing plant diversity
- Incresing spatial diversity (vertical structure)
- Survival post treatment (fallen trees by wind and/or snow, possible affection to thicket cover…)
- Possible effect of pest events

✓ What is the effect of elevation, orientation and the main species in similar treatments on the variables listed above?

✓ What is the effect of the type of machinery used for the removal of wooden remainings in relation to:

- Regeneration of tree species?
- Recruitment of other species?
- Growing/survival rate of associated thicket?

CONSEJERÍA DE MEDIO AMBIENTE Y ORDENACIÓN DEL TERRITORIO

METHODOLOGICAL DESIGN

MAIN FACTOR: Treatment. Types:
control, 30 % 50 % y 70%)

OTHER FACTORS: Elevation,
orientation, main species

Nº DE PARCELAS POR ZONA DE SEGUIMIENTO

- NEVADA: 18
- MARQUESADO: 6
- BÉRCHULES: 12
- DÍLAR: 17
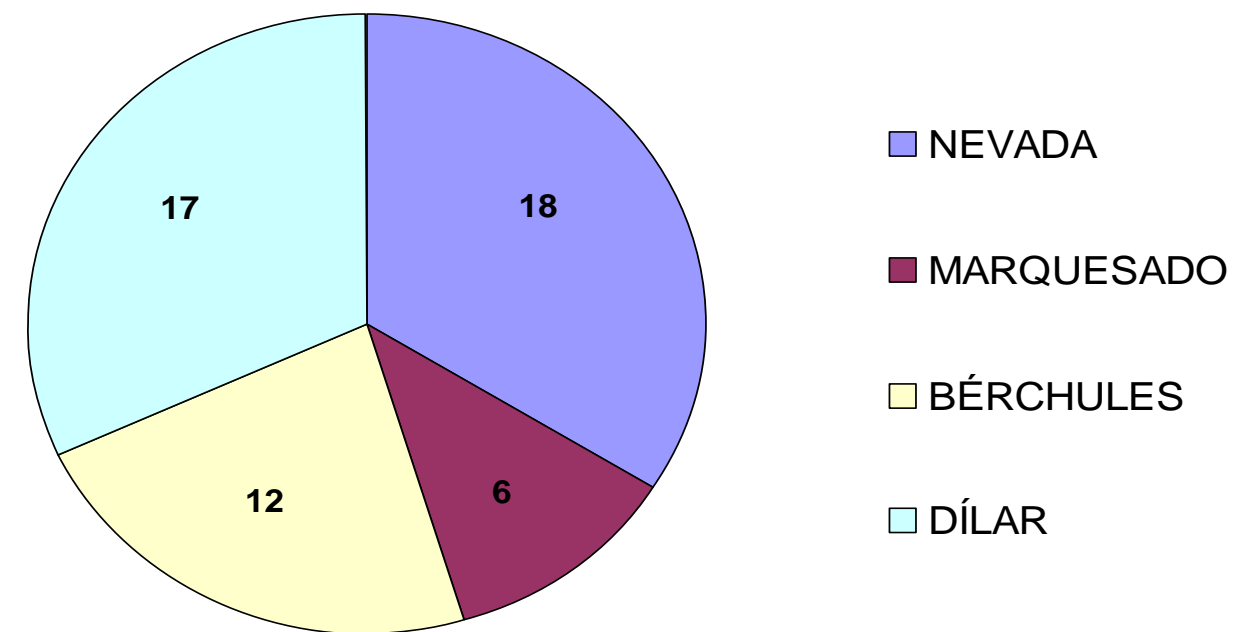
ZONE	DOMINANT TREE SPECIES	ELEVATION	INTENSITY OF TREATMENT (%)
NEVADA	*Pinus sylvestris / P. nigra*	HIGH / MEDIUM	CONTROL / 50 / 70
MARQUESADO	*Pinus sylvestris*	HIGH	CONTROL / 30 /50 / 70
BÉRCHULES	*Pinus sylvestris*	LOW	CONTROL / 30 / 50 / 70
DÍLAR	*Pinus halepensis / P. pinaster*	HIGH / MEDIUM	CONTROL / 30 / 50

Project: Adaptive management of *Quercus pyrenaica* formations to global change processes in Sierra Nevada

Objective: improving and recovery of *Quercus pyrenaica* formations in S. N. as an adapting and enhancing measures to prevent possible effects by global change events.
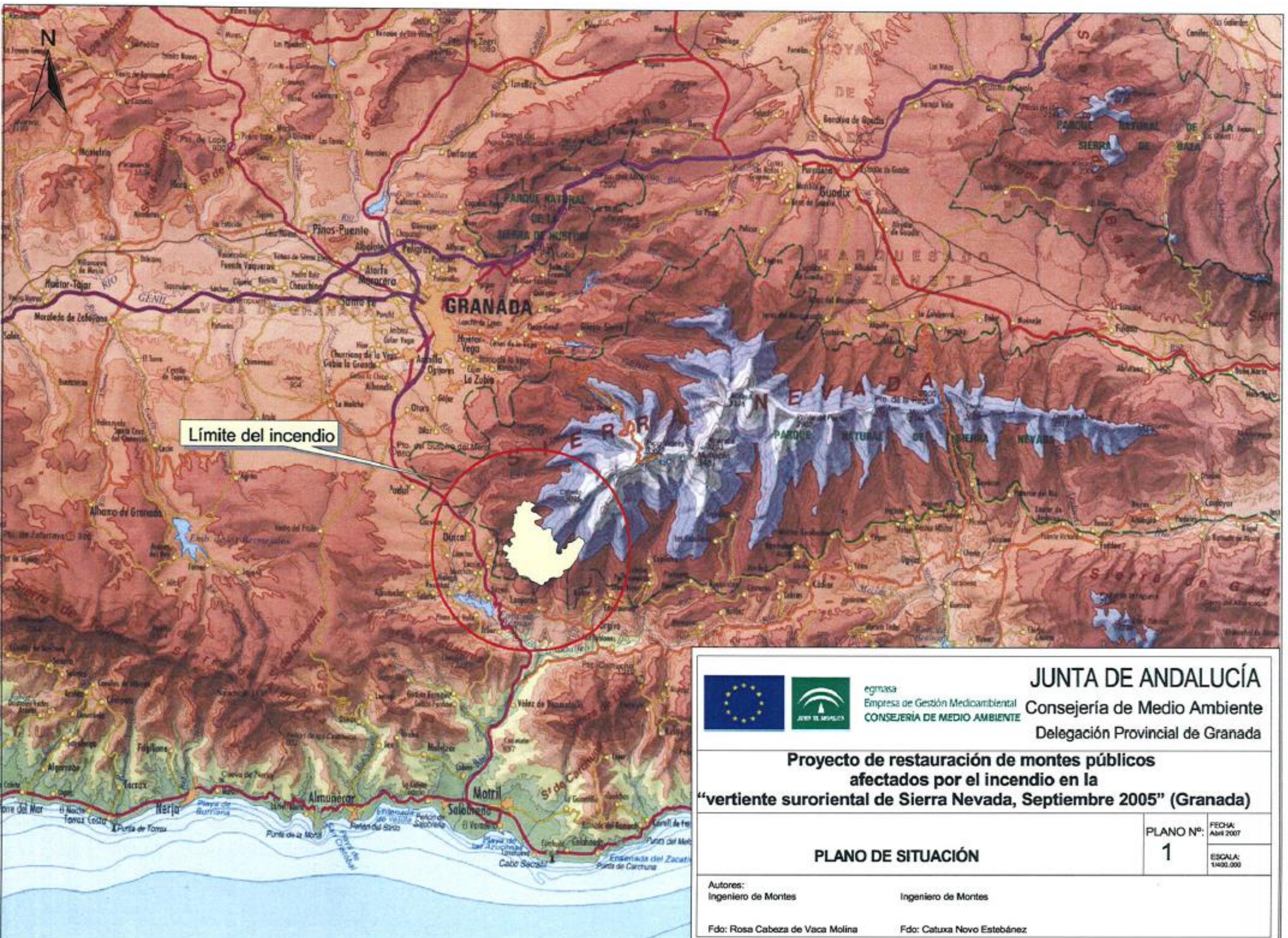
Zelected zones:
• With some sort of deterioration, a *priori*

• Potential zones of the association *Adenocarpo decorticantis-Querceto pyrenaicae*, occupied by pine plantations
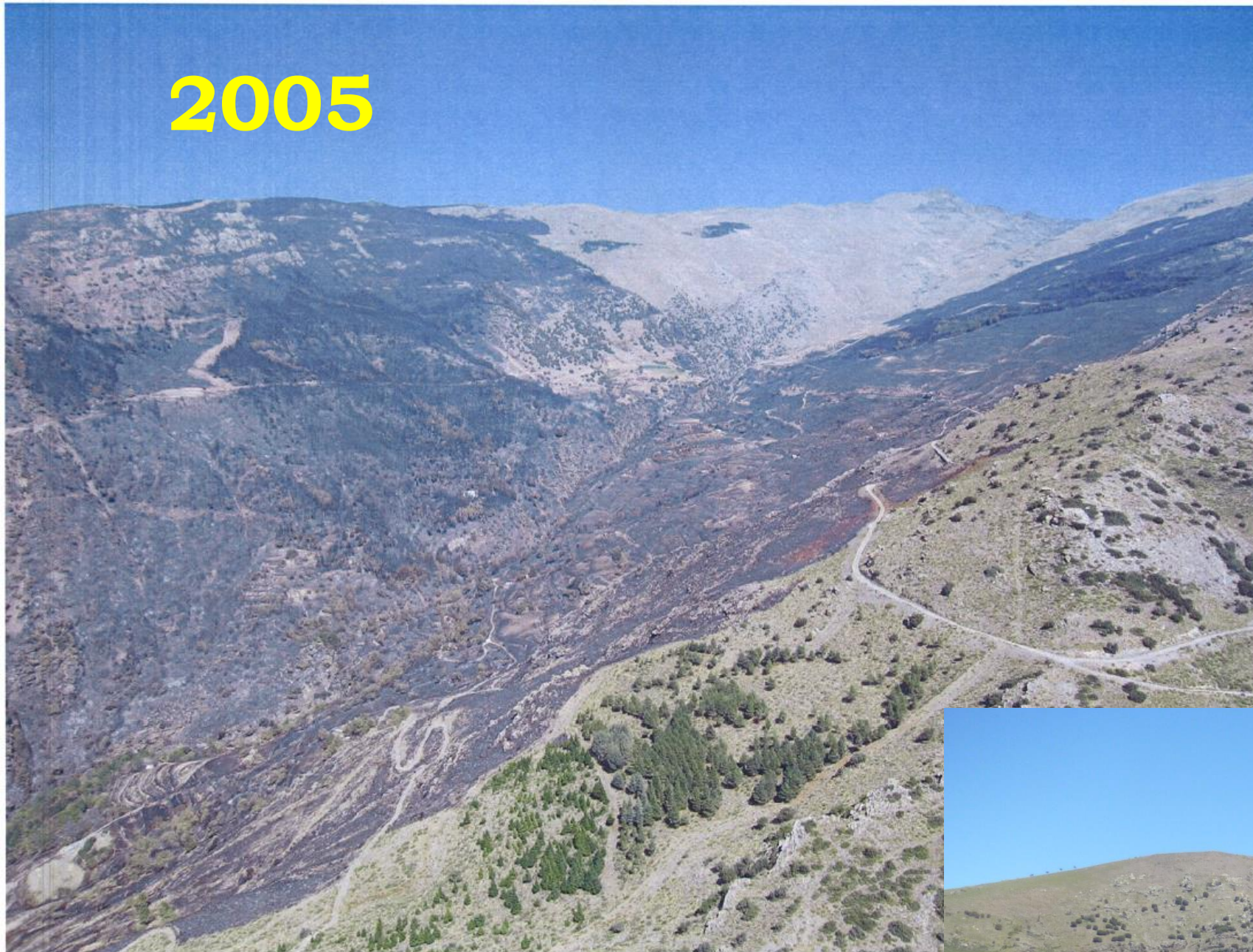
Measures:

• Cutting *Pinus sylvestris, P. nigra y P. pinaster. Reducing the density to approximately* 750 trees/ha.

•Oak pruning and reshape

• Selective manual clearance of thicket

•Plantations

Restoration post-fire

Límite del incendio

JUNTA DE ANDALUCÍA
Consejería de Medio Ambiente
Delegación Provincial de Granada

egmasa
Empresa de Gestión Medioambiental
CONSEJERÍA DE MEDIO AMBIENTE

Proyecto de restauración de montes públicos
afectados por el incendio en la
"vertiente suroriental de Sierra Nevada, Septiembre 2005" (Granada)

PLANO Nº: 1

FECHA: Abril 2007

ESCALA: 1/400.000

PLANO DE SITUACIÓN

Autores:
Ingeniero de Montes   Ingeniero de Montes

Fdo: Rosa Cabeza de Vaca Molina   Fdo: Catuxa Novo Estébánez

2005

2013

CONSEJERÍA DE MEDIO AMBIENT

Legend:
- Núcleos donde se ha hecho seguimiento
- Nucleos de dispersión plantados y zonas de tratamiento
- Plantones en Nigüelas
- Repoblación de Nigüelas
- Plantones de Lanjarón
- Repoblación Convenio Aguas Lanjarón
- Zonas de tratamiento post-incendio

1:20.000
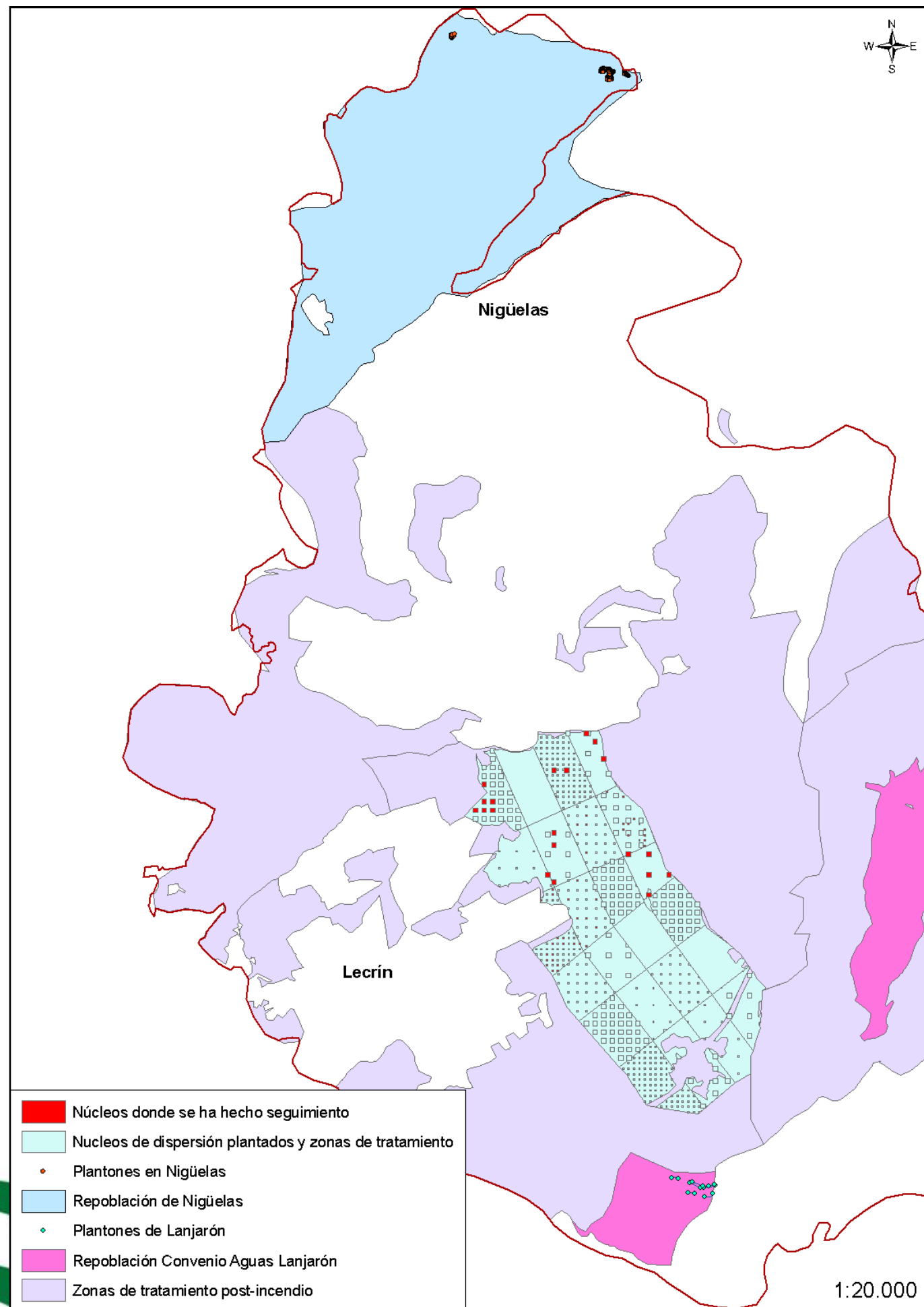
- **Higher winter mortality: *Berberis hispanica.***

- **Highest mortality rate between 2010 and 2011: *Prunus ramburii*, (mostly died in 2012).**

- **Best adapted thicket species: *Rosa canina* and *Crataegus monogyna.***

- **Best adapted tree species: *Pinus pinaster* in lower areas and *Quercus ilex* in higher areas.**

- **Thicket coverage favour growth in size and the survival of the species, specially *Ulex*.**

- **The species with the most outbraking capacity has been *Crataegus monogyna,* whereas *Berberis hispanica* showed the lower.**

- **Drought episodes increase mortality rates (2012)**

APPROACHES

- ***Adaptive management***: building or increasing ecosystem resilience

- ***Integrative approach***: scientists and managers working together

- ***Management evaluation***: continuous feedback

- ***Broad project dissemination***: giving back to the society - Information system

THANK YOU VERY MUCH