Wildfire Management in the New Age

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Oregon State University

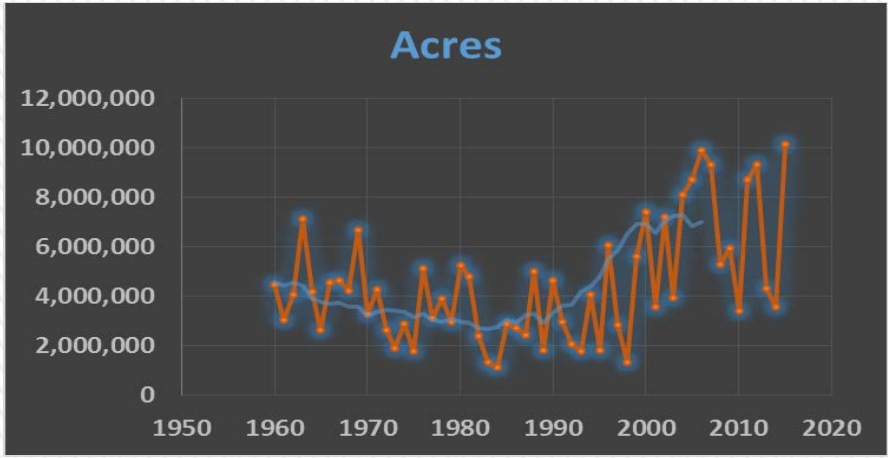
Oregon State University OSU

TODAY

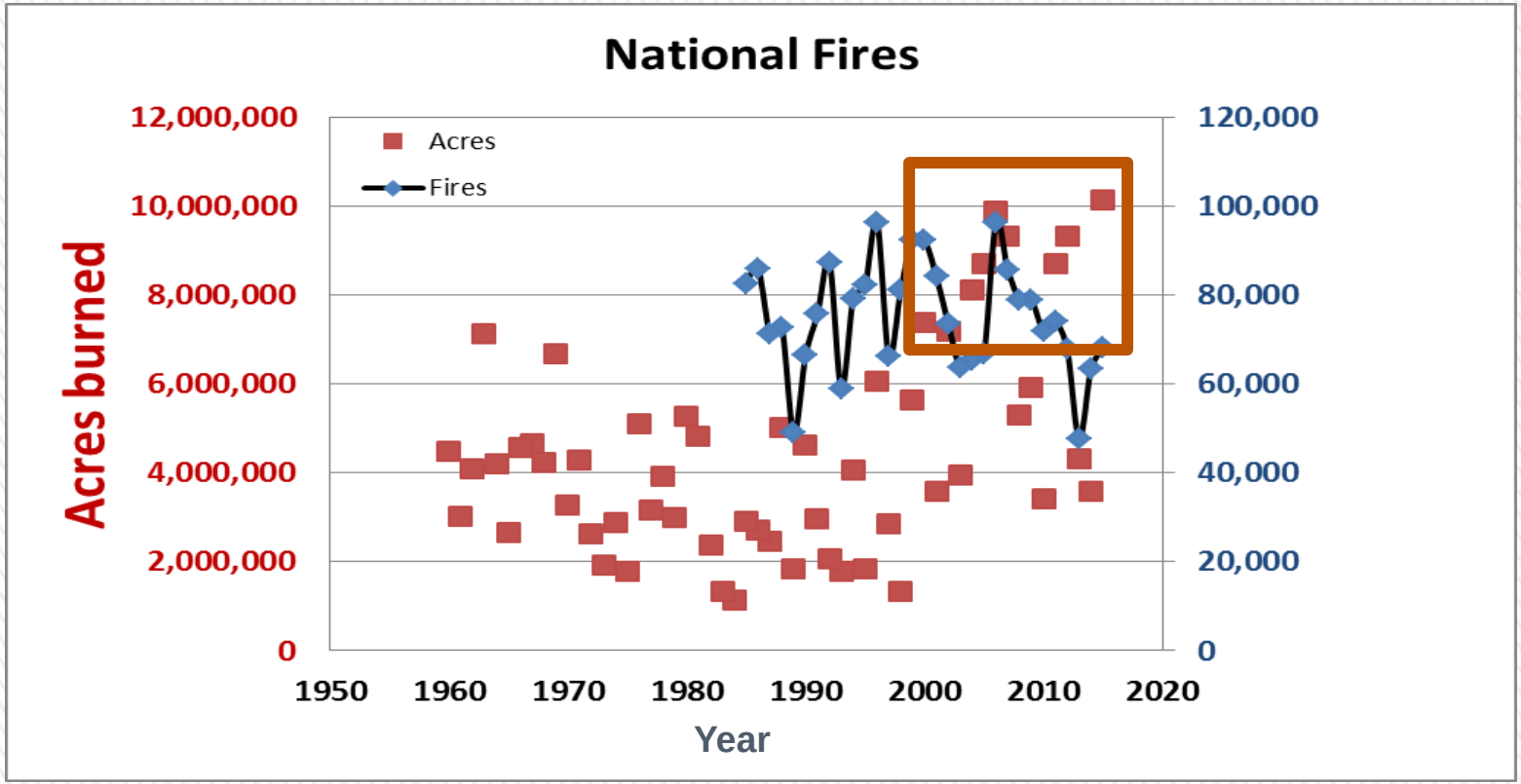
- Anomalies
  - Emerging crisis in wildland fire management
- New paradigm
  - Landscapes
  - Preparedness
- Cost Savings

Anomalies:

1. Ecological role of fire
2. Elevated hazard
3. Elevated risks
4. Climate change and fire seasons/behavior



NIFC



National Interagency Fire Center

Past and Present:

- PNW has been warming since 1975
- Precipitation is up 10-30% since 1900
- April 1st snowpack down 50% from 1950-2000
- **Fire seasons** are now 30+ days longer

Danielle Robbins

Climate Change

Projections - fire

- Warmer temperatures in the spring and summer
  - Earlier snowmelt and deeper drought periods
- Increases in frequency (?), extent and severity; 1.4 to 5 fold
- Impacts through direct damage, loss of growth, extended mortality
- Greatest losses in fire sensitive systems

Chmura *et al.* 2011

1. Ecological role of fire
2. Elevated hazard
3. Elevated risks
4. Climate and fire
5. **Fuels treatments can happen and are effective**
   - > Stand-level hazard (WUI)
   - > Landscape-level fire risk
   - > Positive return on that investment

1. Ecological role of fire
2. Elevated hazard
3. Elevated risks
4. Climate and fire
5. **Treatments are effective**

BUT, our treatments cannot currently match the rate of fuel accumulation

- > Forest growth and succession
- > $$$ and bureaucracies
- > Markets and infrastructure

» **Wildland fire will continue and "worsen"**

›

SUMMARY:
Climate, fuel and fire

- Mixed-severity fire regimes were prevalent throughout the West
- Transition from “fuel-limited” to “climate-driven” fires
  - Initial Attack success is declining
  - More fires get larger and burn longer
  - Fires cost more on average – suppression and values impacted

Emerging Science ›

SUMMARY:

- Suppression Costs
- Ecological Damage
  - > “Catastrophic”
- Property Loss and Insurance
- Human Life

Costs ›

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The reservoir WILL spill sooner or later.

How and when are we going to spill the biomass already behind the reservoir (and accumulating every year)?

How do we do it safely and efficiently?

WUI and beyond…

How can it connect to other natural resource management objectives?

Crisis

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FIRE BEHAVIOR GRADIENT

Low → Mixed → High

Conceptual Framework

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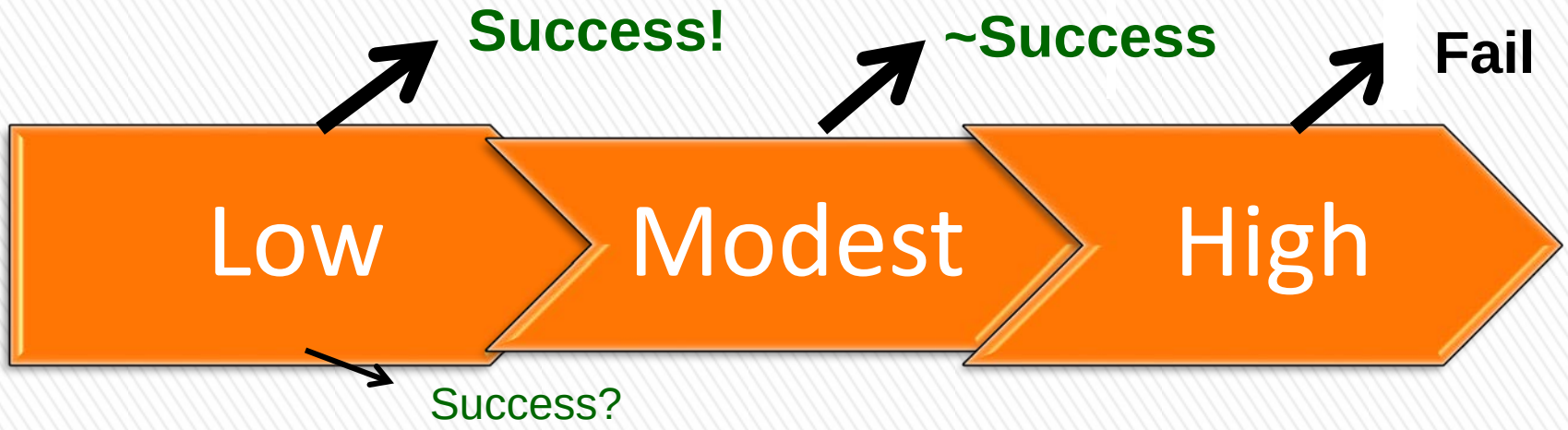

Prescribed Burning

1900's Suppression Model

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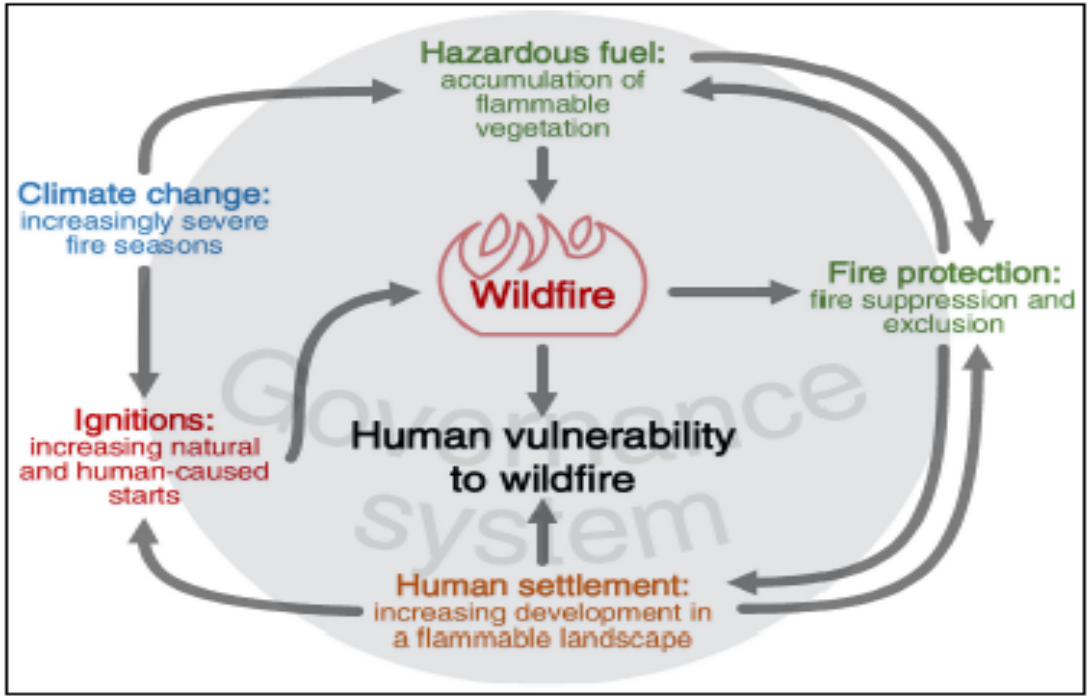

Figure 1. *Wildfire risk in fire-prone temperate forests is a result of interacting positive feedback loops that link wildfire and human vulnerability through key drivers of land use and natural resource management.*

Fischer* et al. *2016* *Frontiers in Ecology 14(5)

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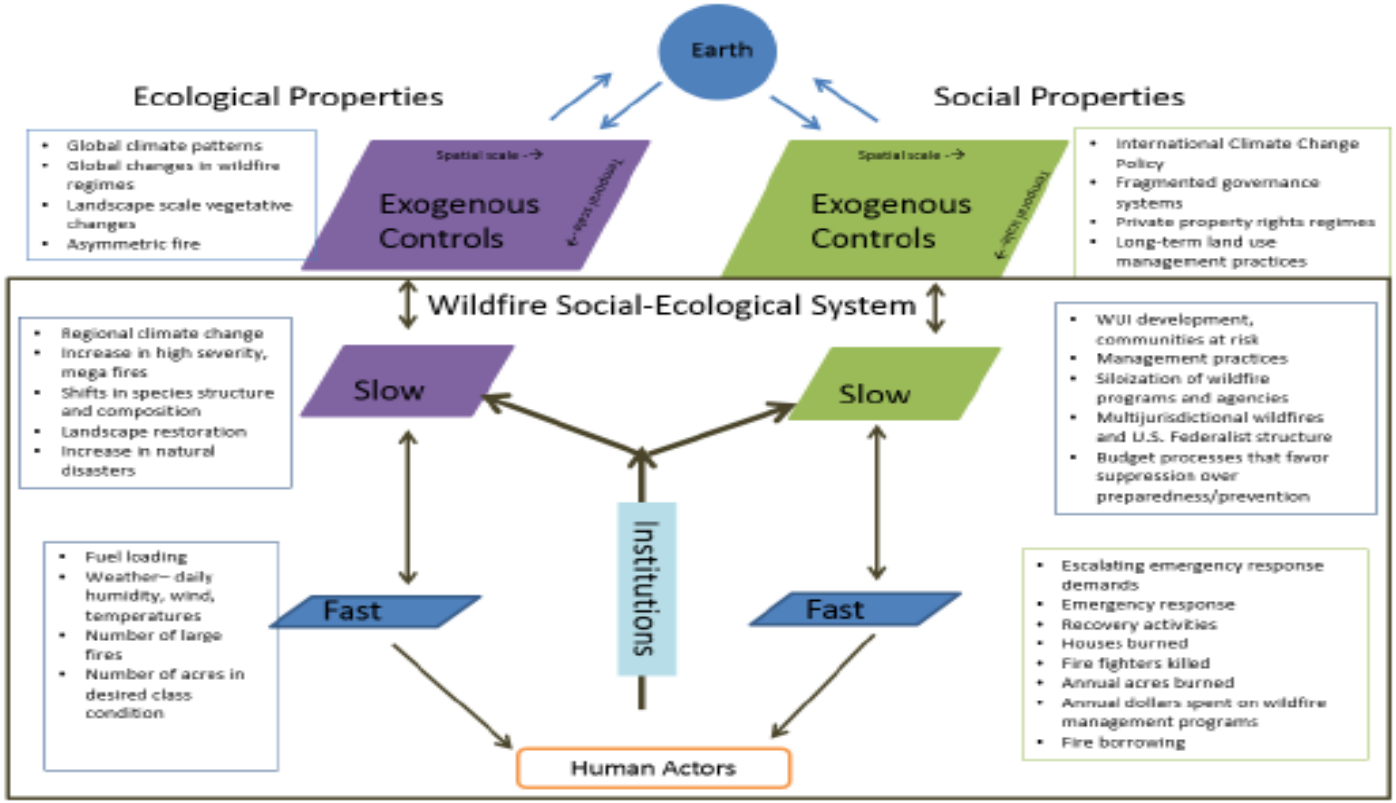
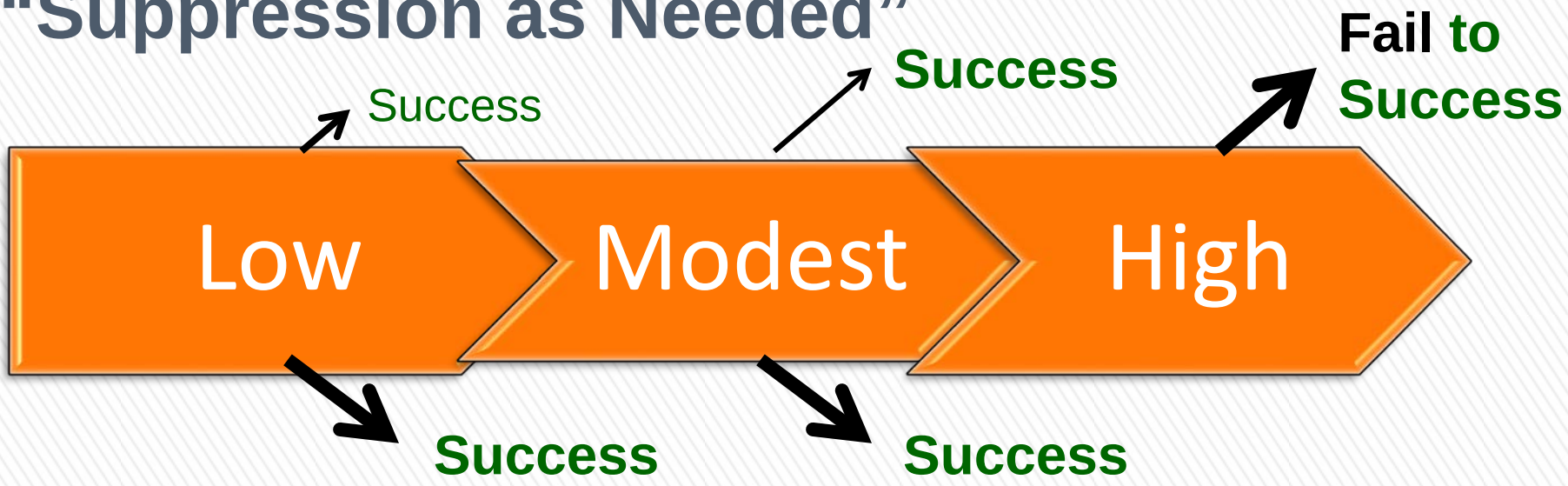
Fig. 1. Wildfire governance in a social-ecological framework.



Steelman 2017 Ecology and Society 21(4)

“Suppression as Needed”



Prescribed Burning – Fire Use

Alternative Future ›

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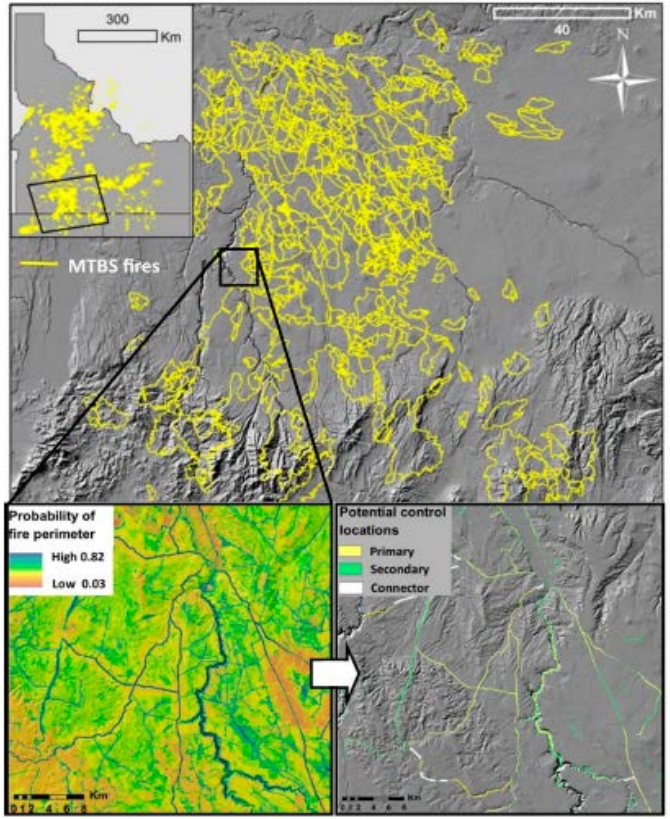
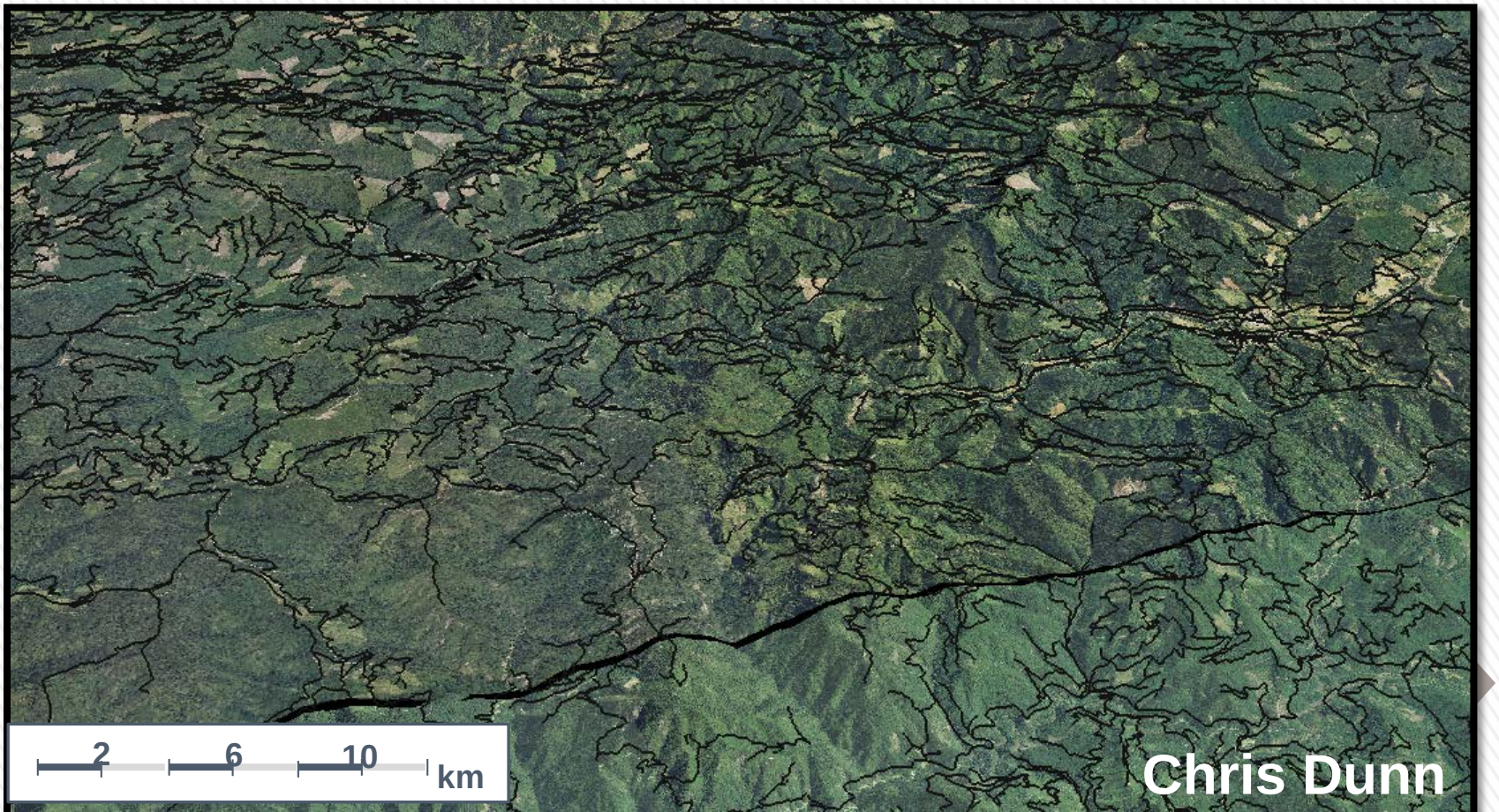
Risk reduction formula

- Large “firesheds” WILL burn
  - Plan for them now: scaled at 5- to 10,000 ac
  - Treatments with roads, topography and ownership
  - Preparedness funding tied to this effort

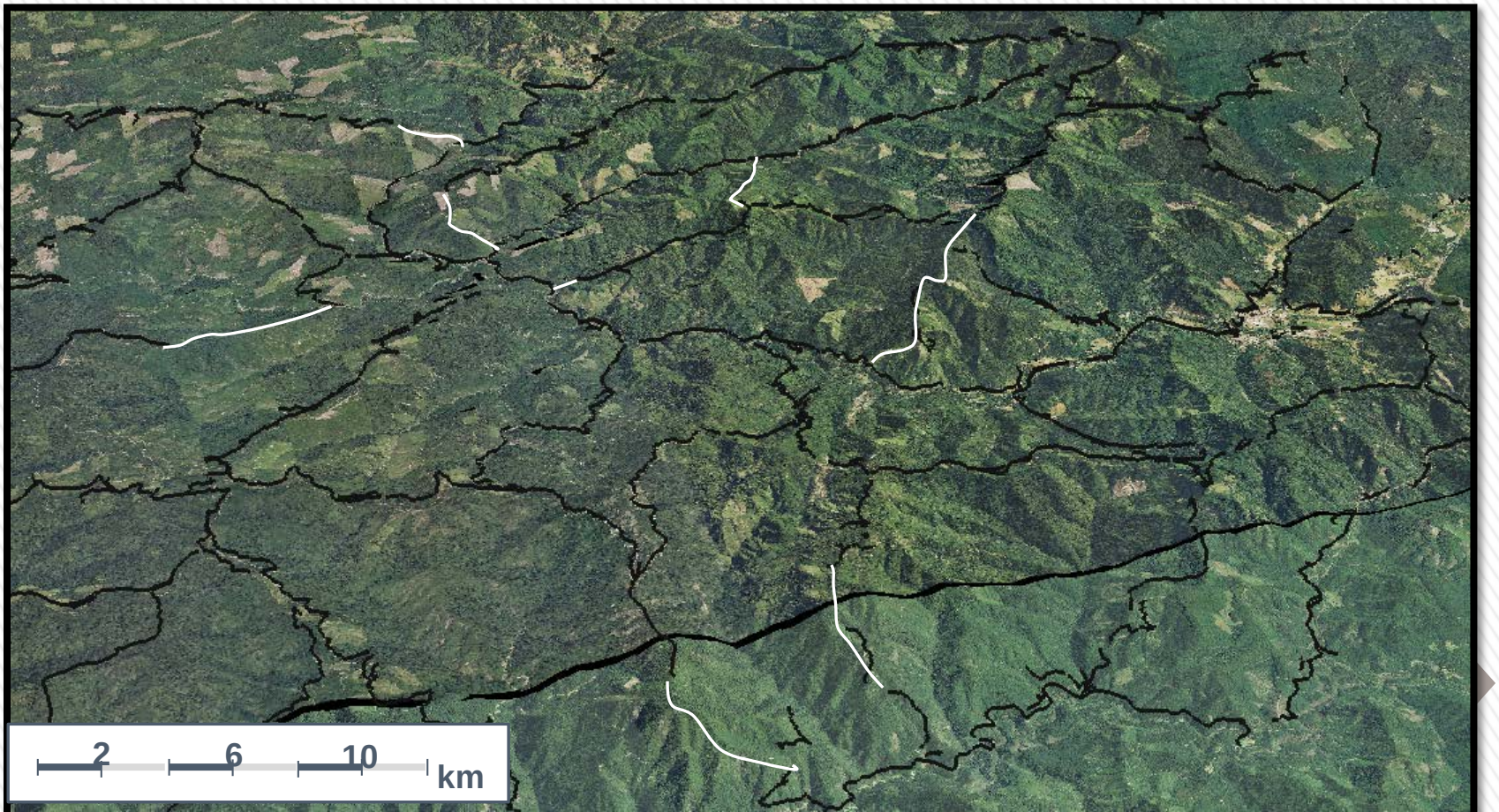


O’Connor et al. *2016* *Geosciences 6(35)*

Response PODs (r-PODs) - *Missoula*

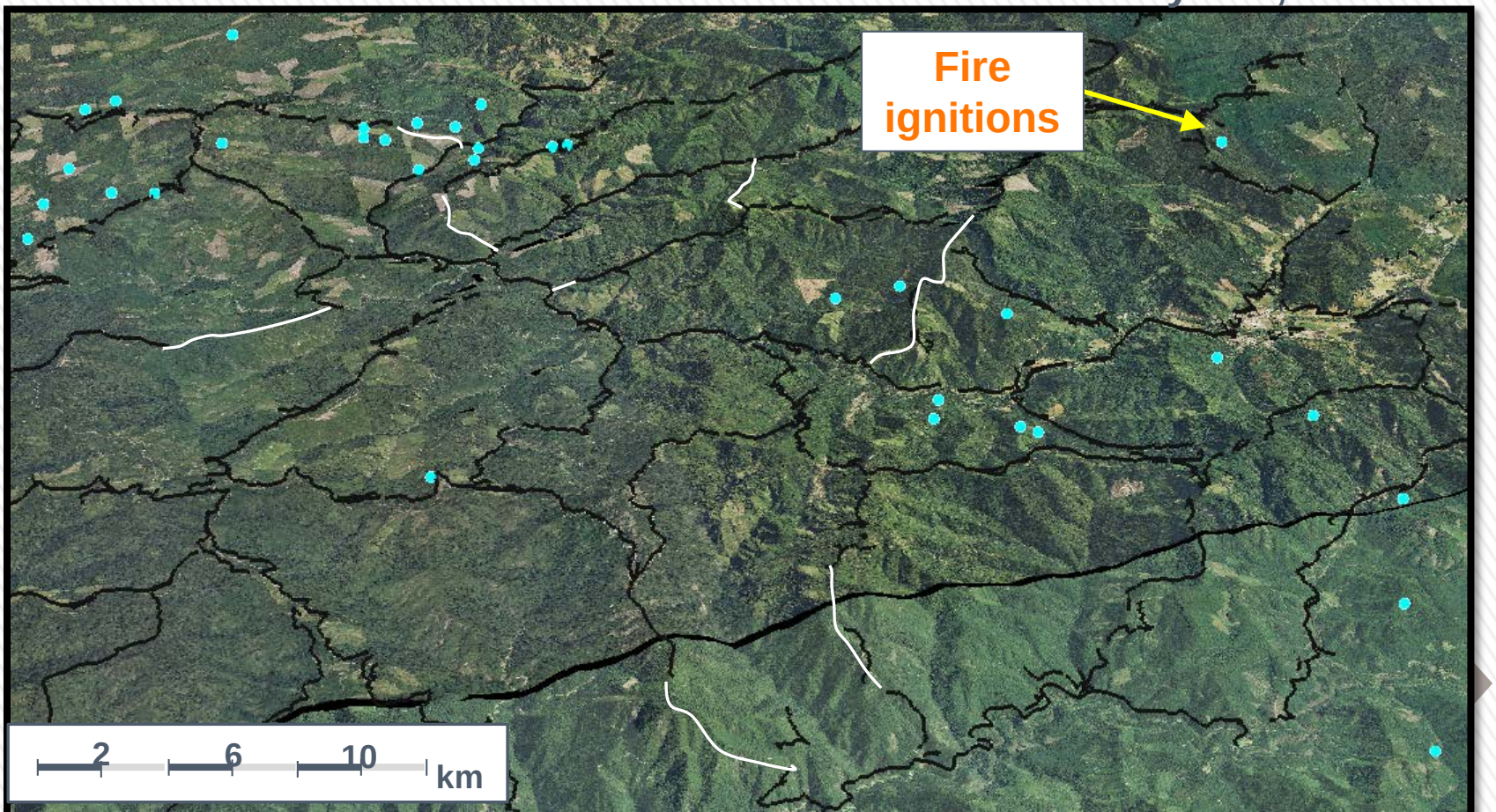


Response PODs (r-PODs)



Means-based objectives

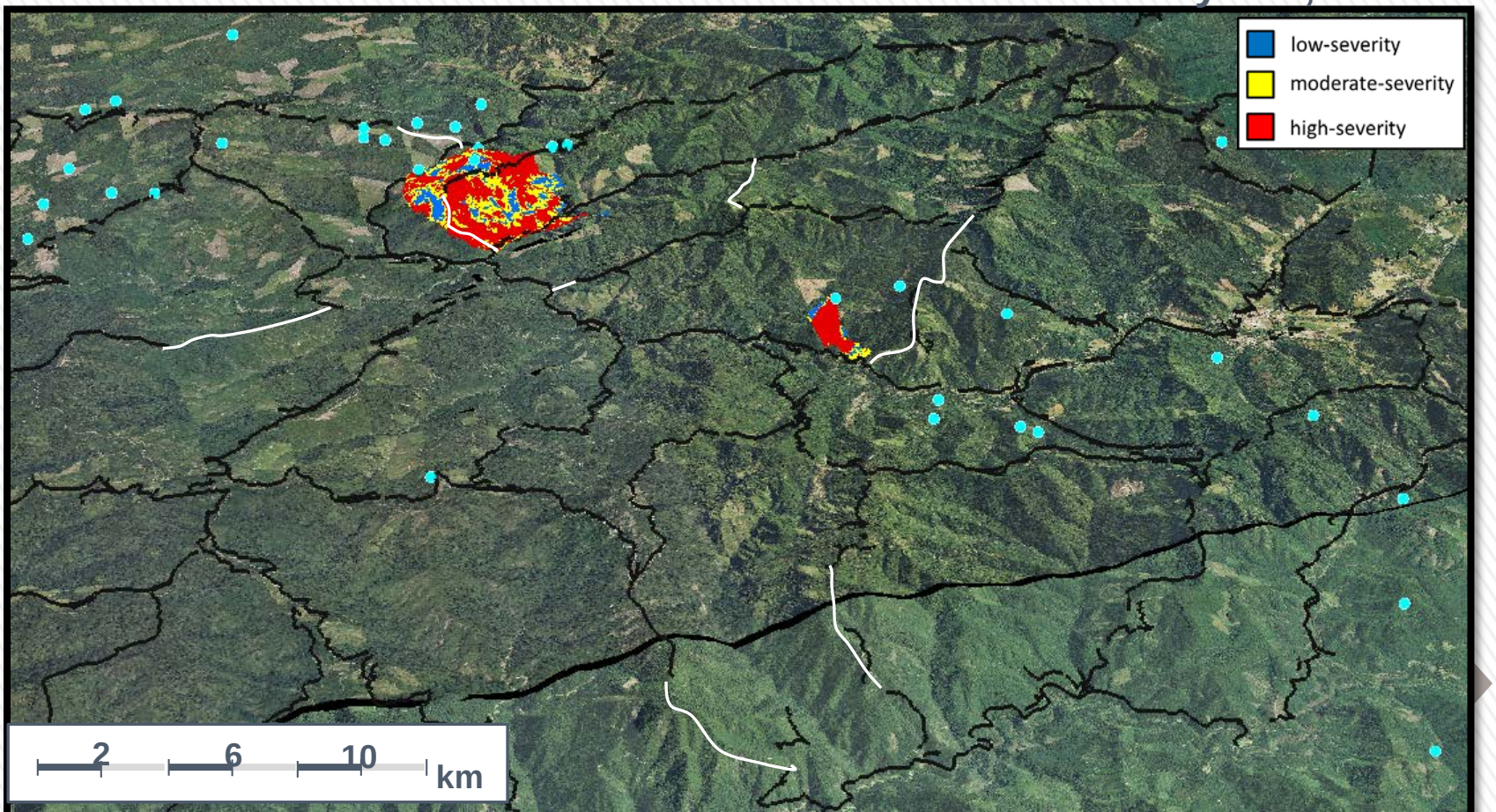
July 26th, 2013



Identify control points from r-PODs

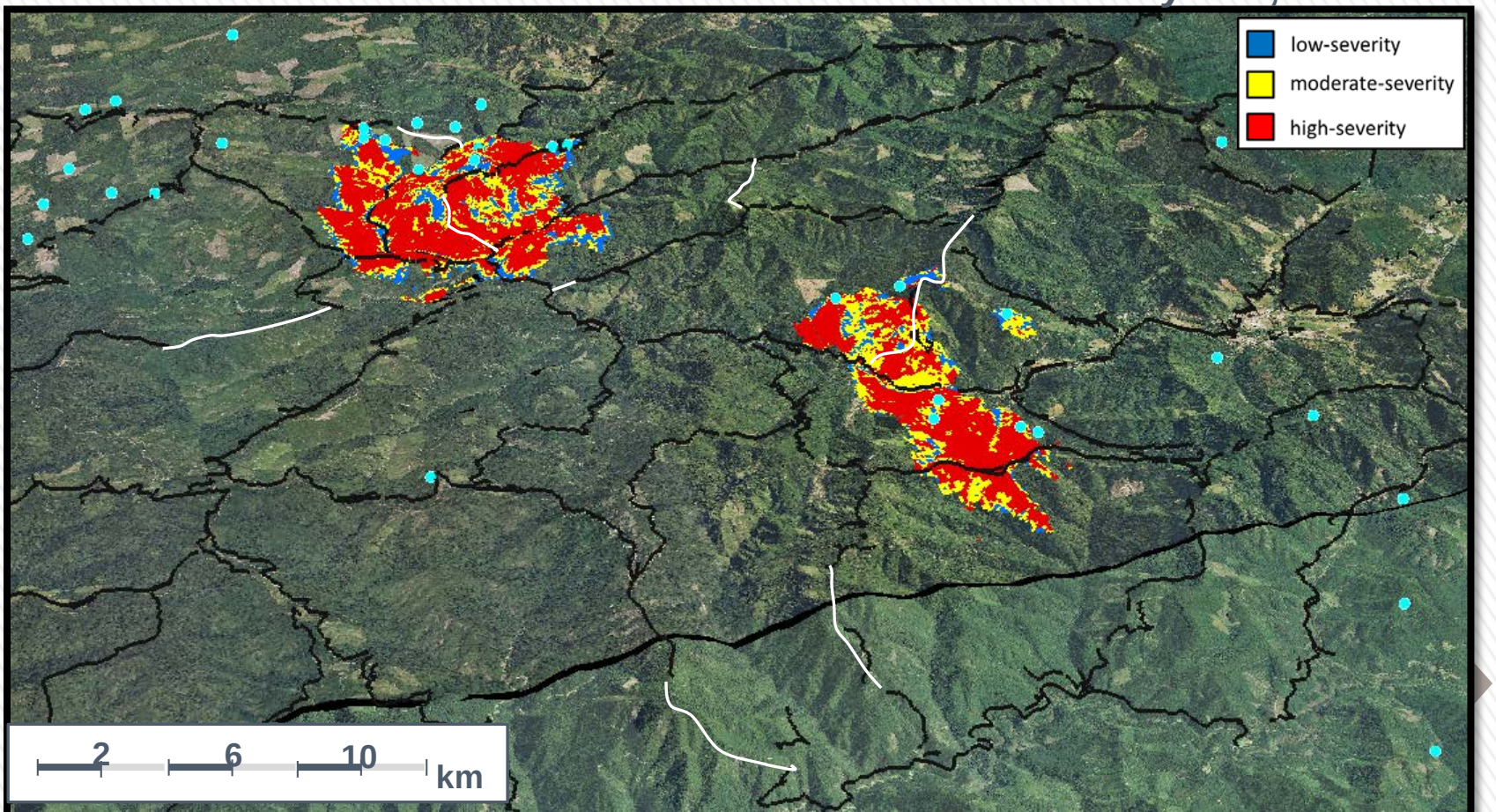
Cumulative area: 1,376 ha

July 26th, 2013



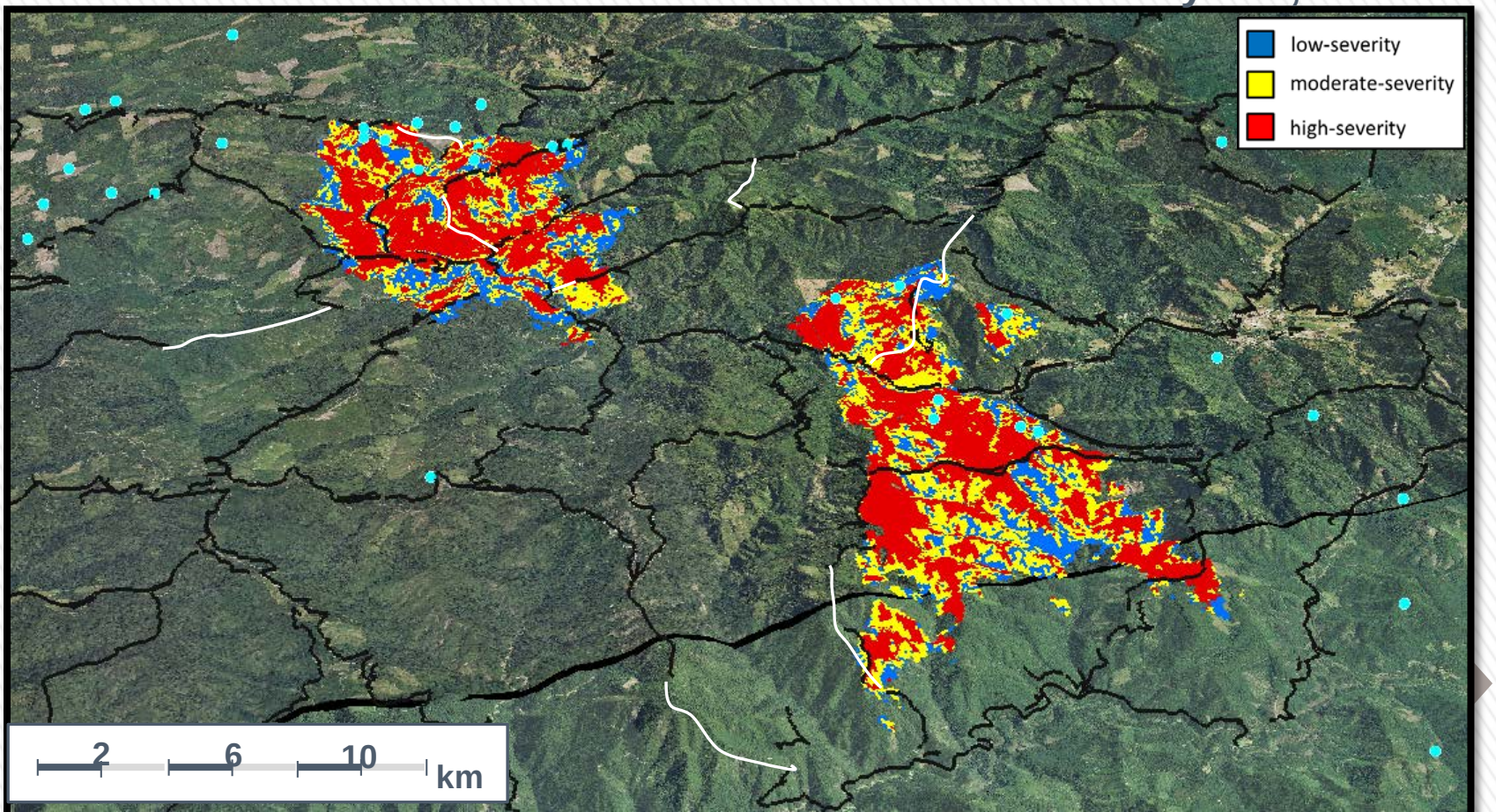
Cumulative area: 4,955 ha

July 27th, 2013



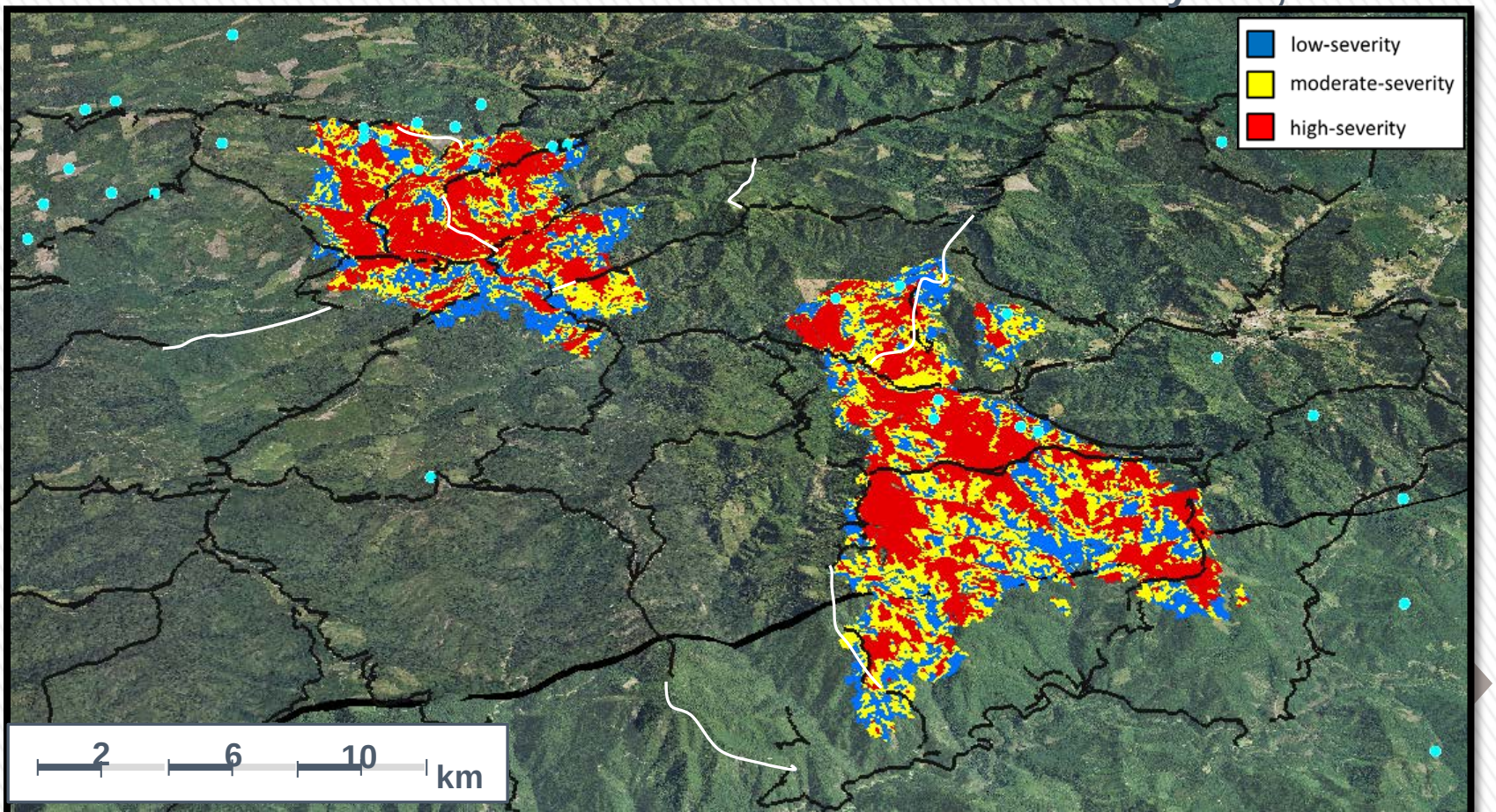
Cumulative area: 8,755 ha

July 28th, 2013



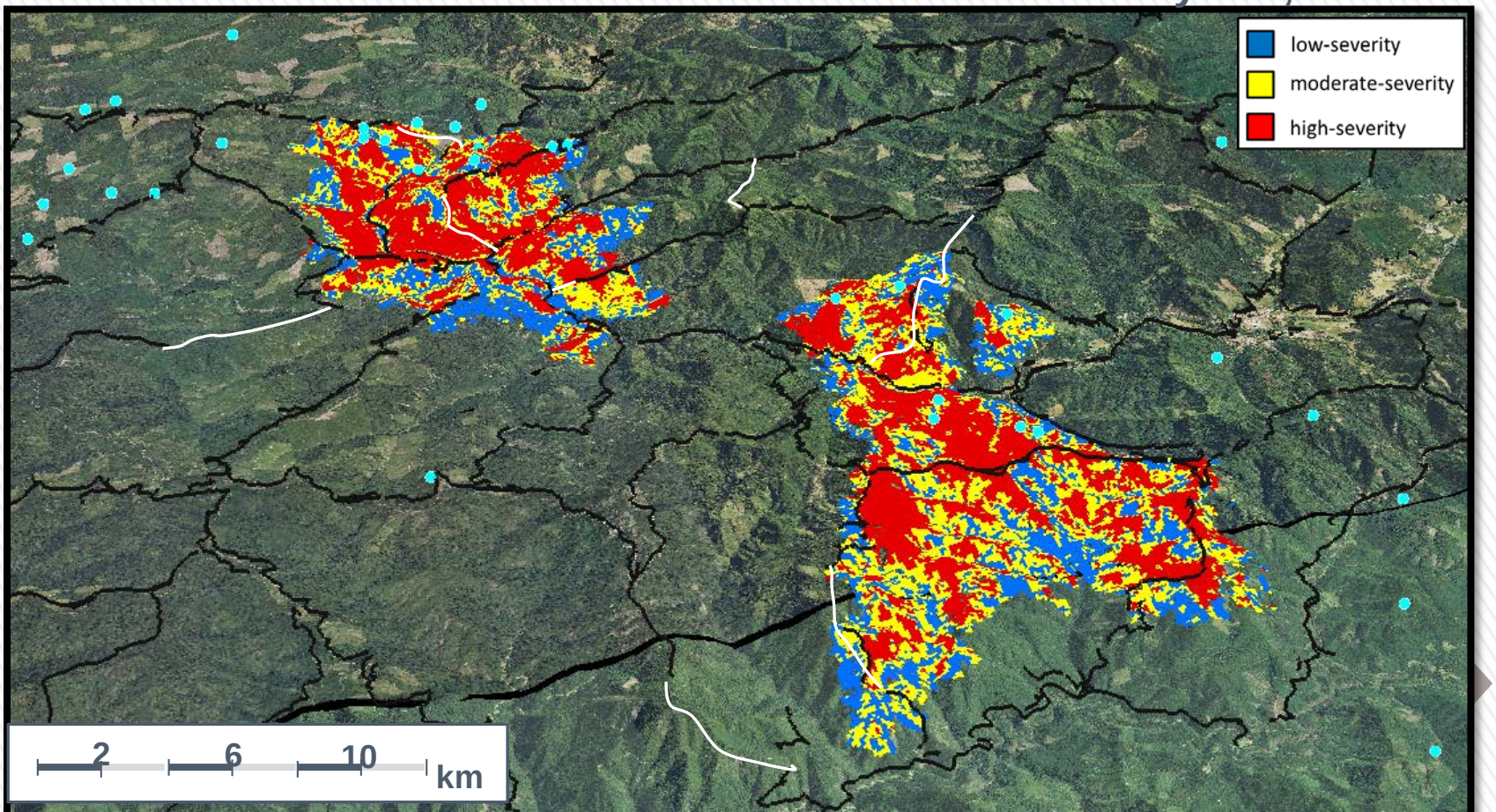
Cumulative area: 10,401 ha

July 29th, 2013



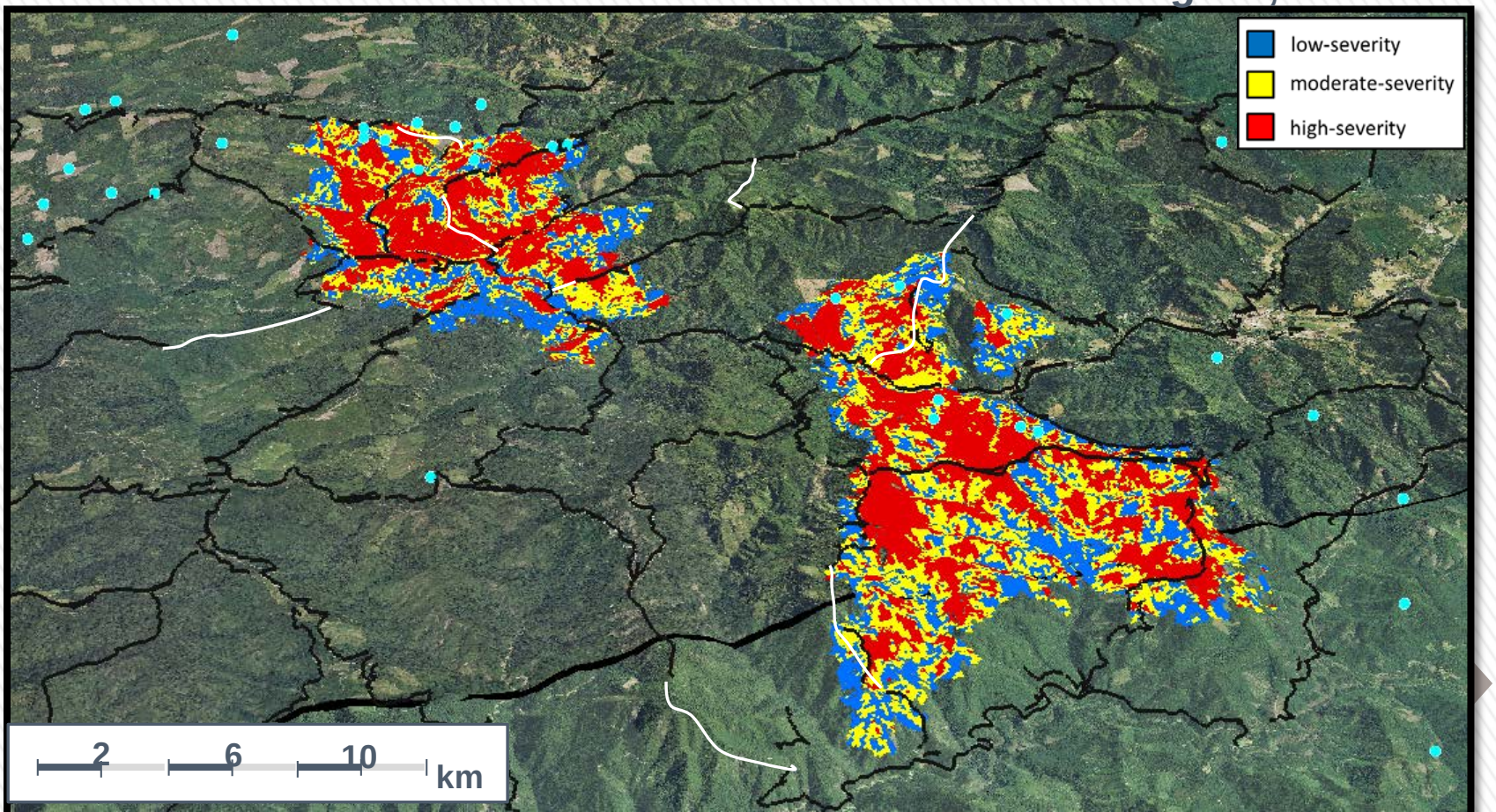
Cumulative area: 11,432 ha

July 30th, 2013



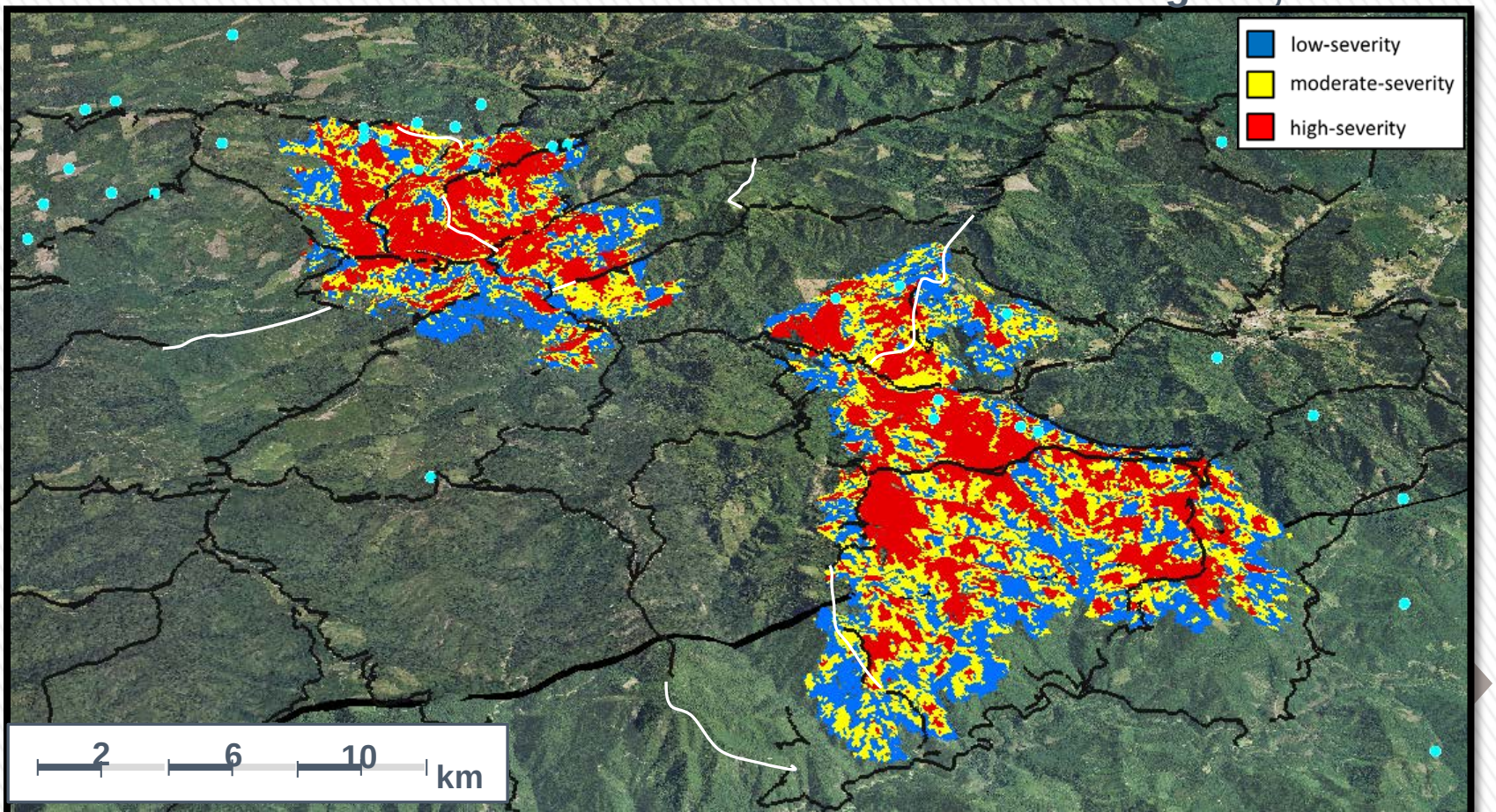
Cumulative area: 11,538 ha

Aug. 1st, 2013



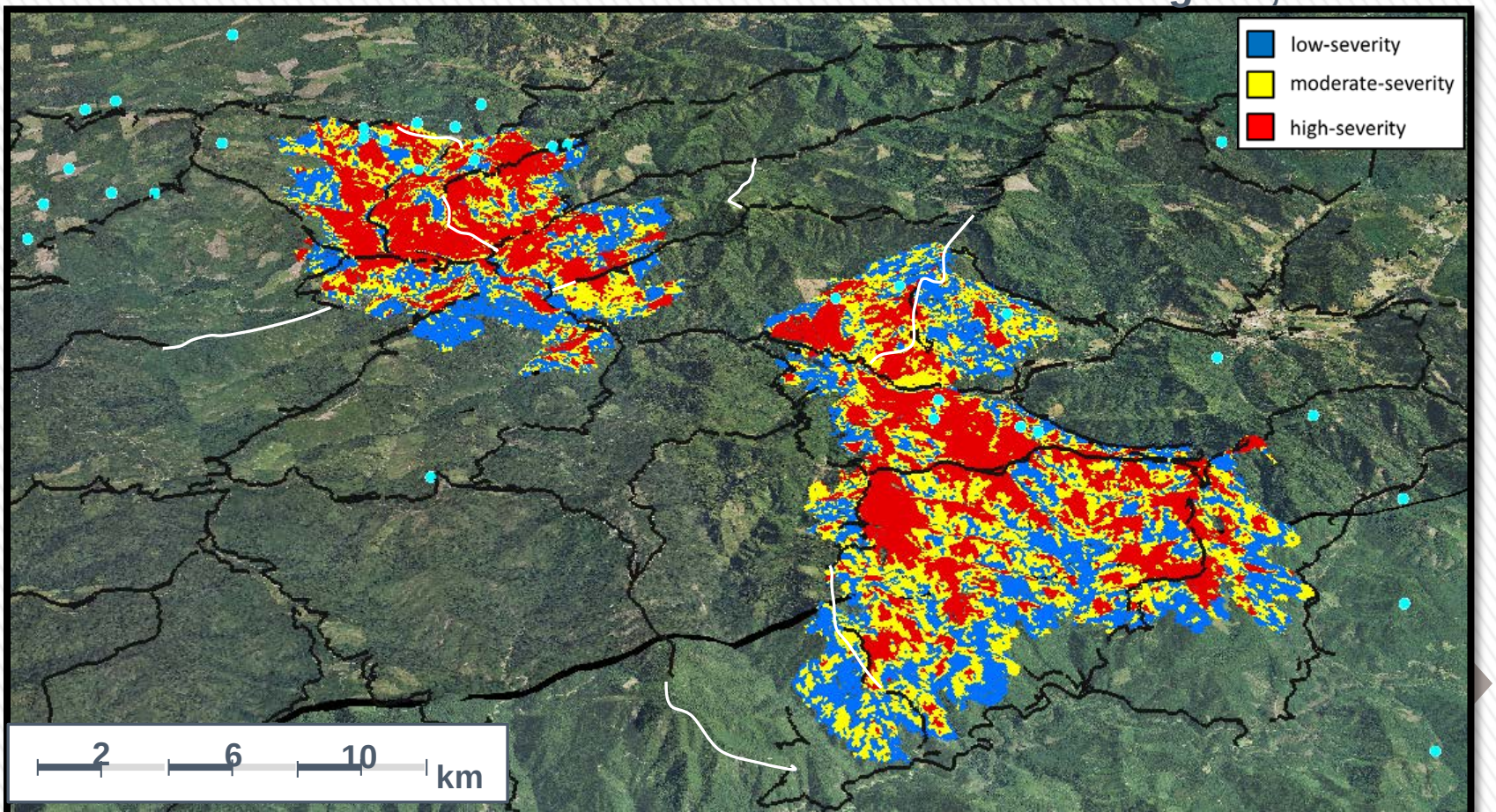
Cumulative area: 13,061 ha

Aug. 2nd, 2013



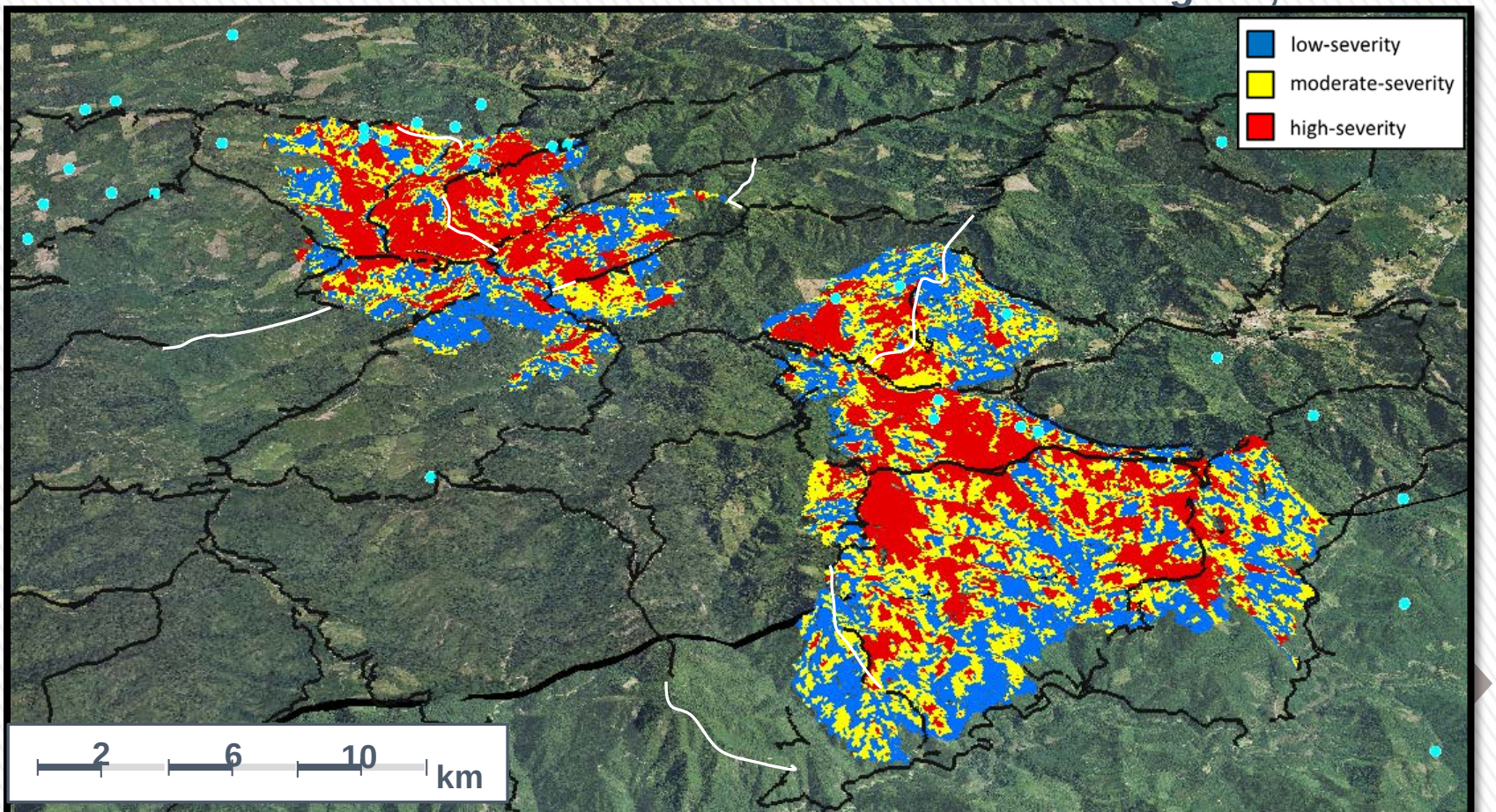
Cumulative area: 13,819 ha

Aug. 3rd, 2013



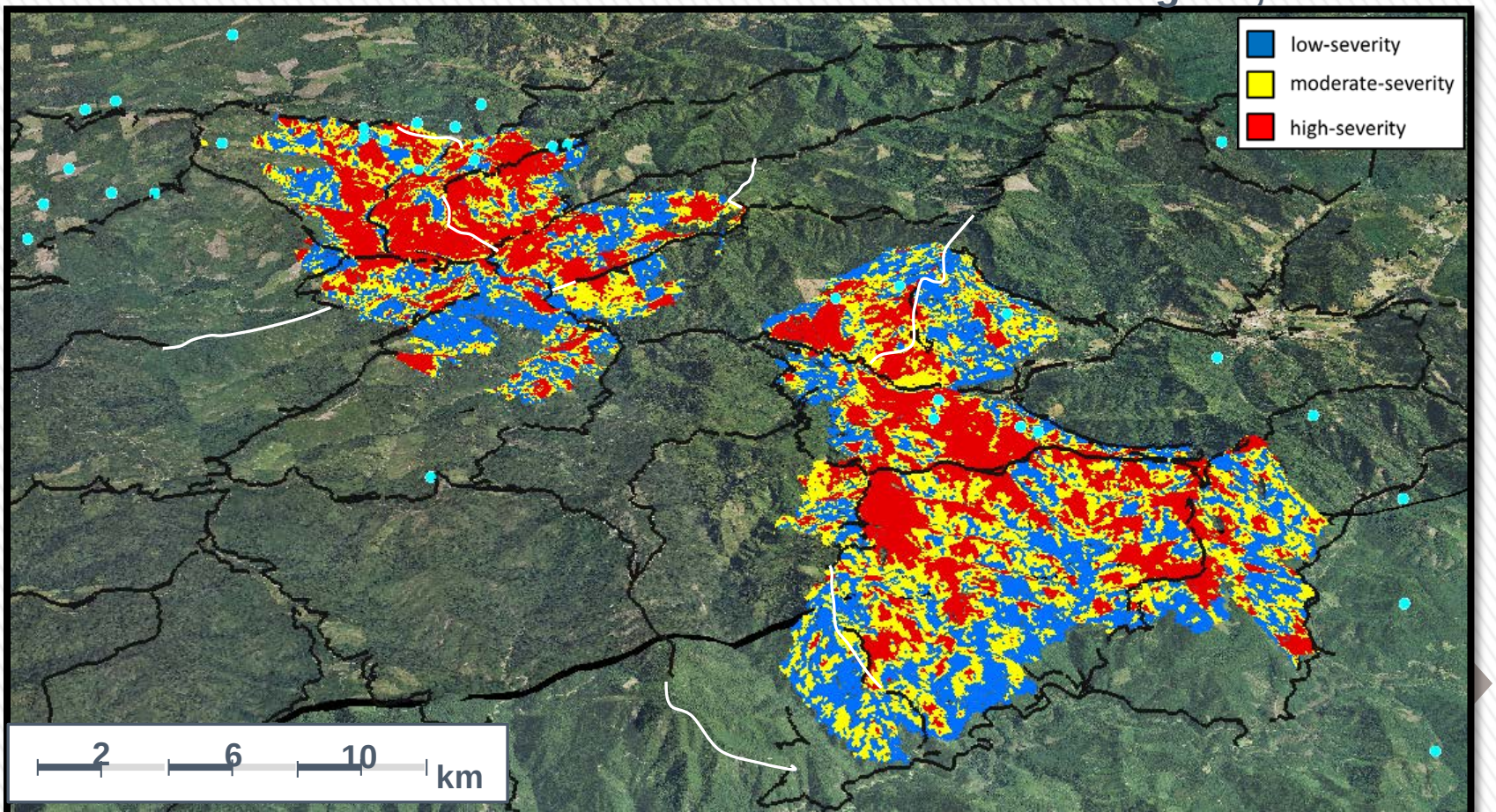
Cumulative area: 14,718 ha

Aug. 4th, 2013



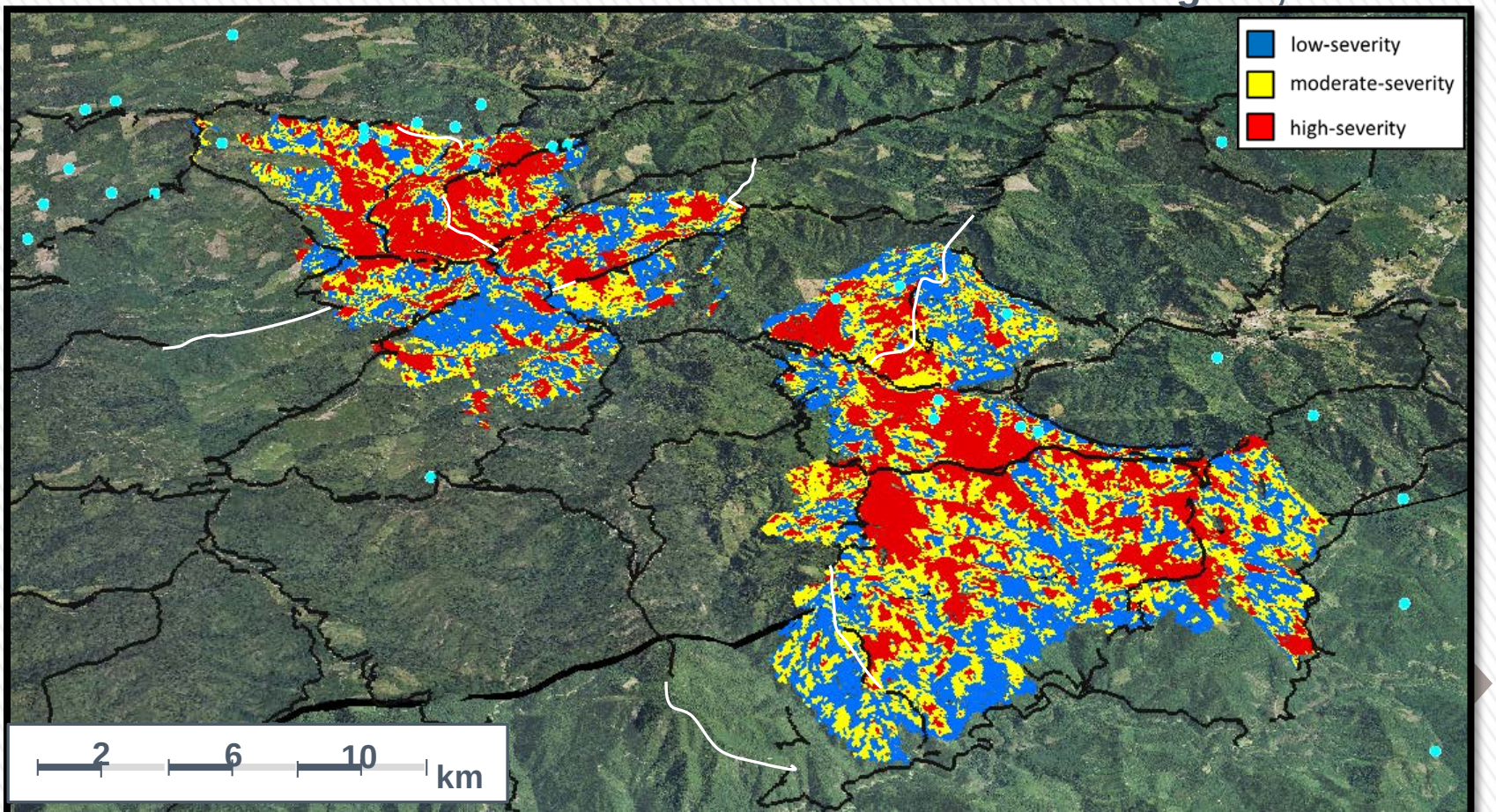
Cumulative area: 15,452 ha

Aug. 5th, 2013



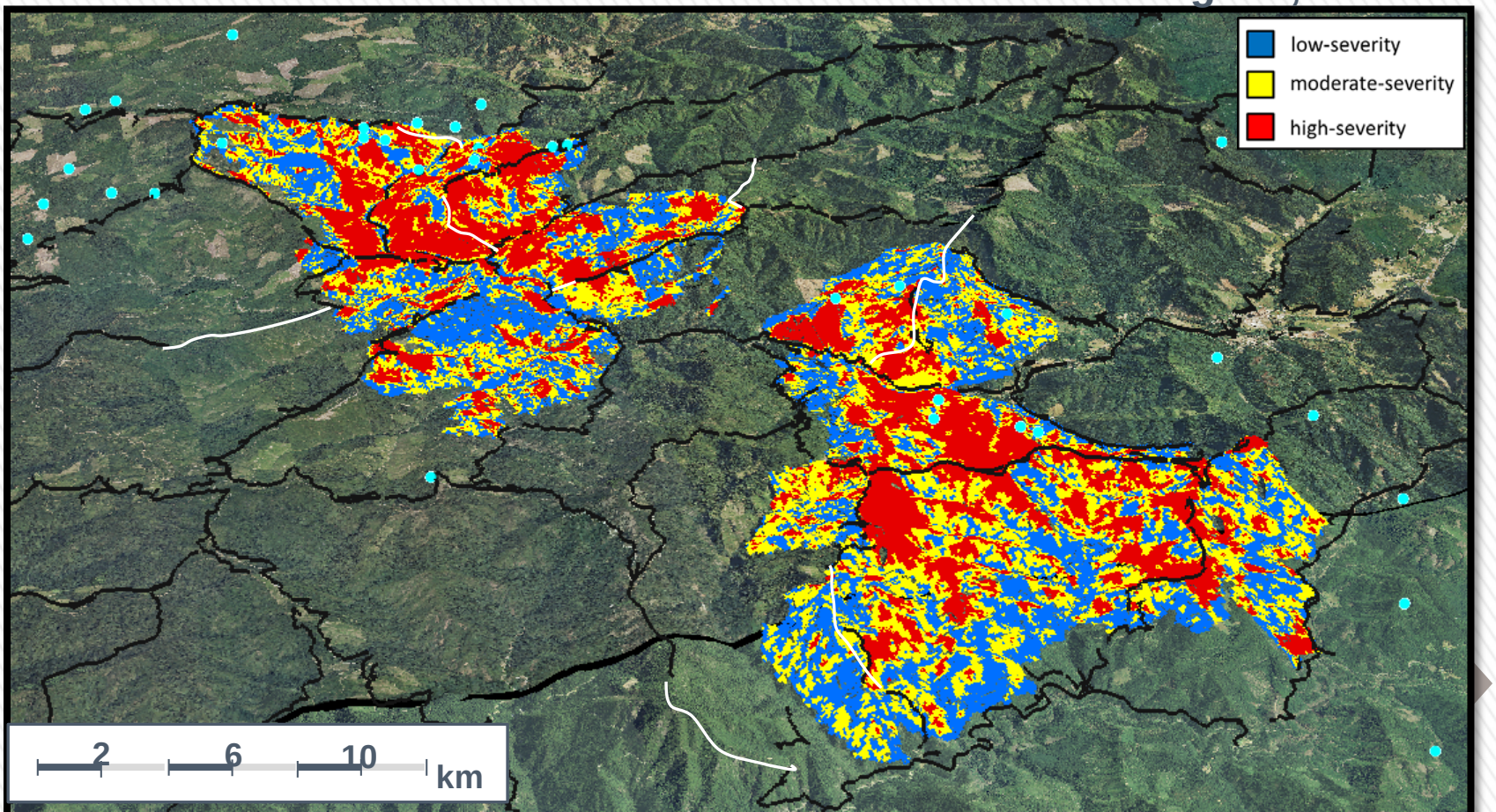
Cumulative area: 16,208 ha

Aug. 6th, 2013



Cumulative area: 17,262 ha

Aug. 7th, 2013



Cumulative area: 17,829 ha

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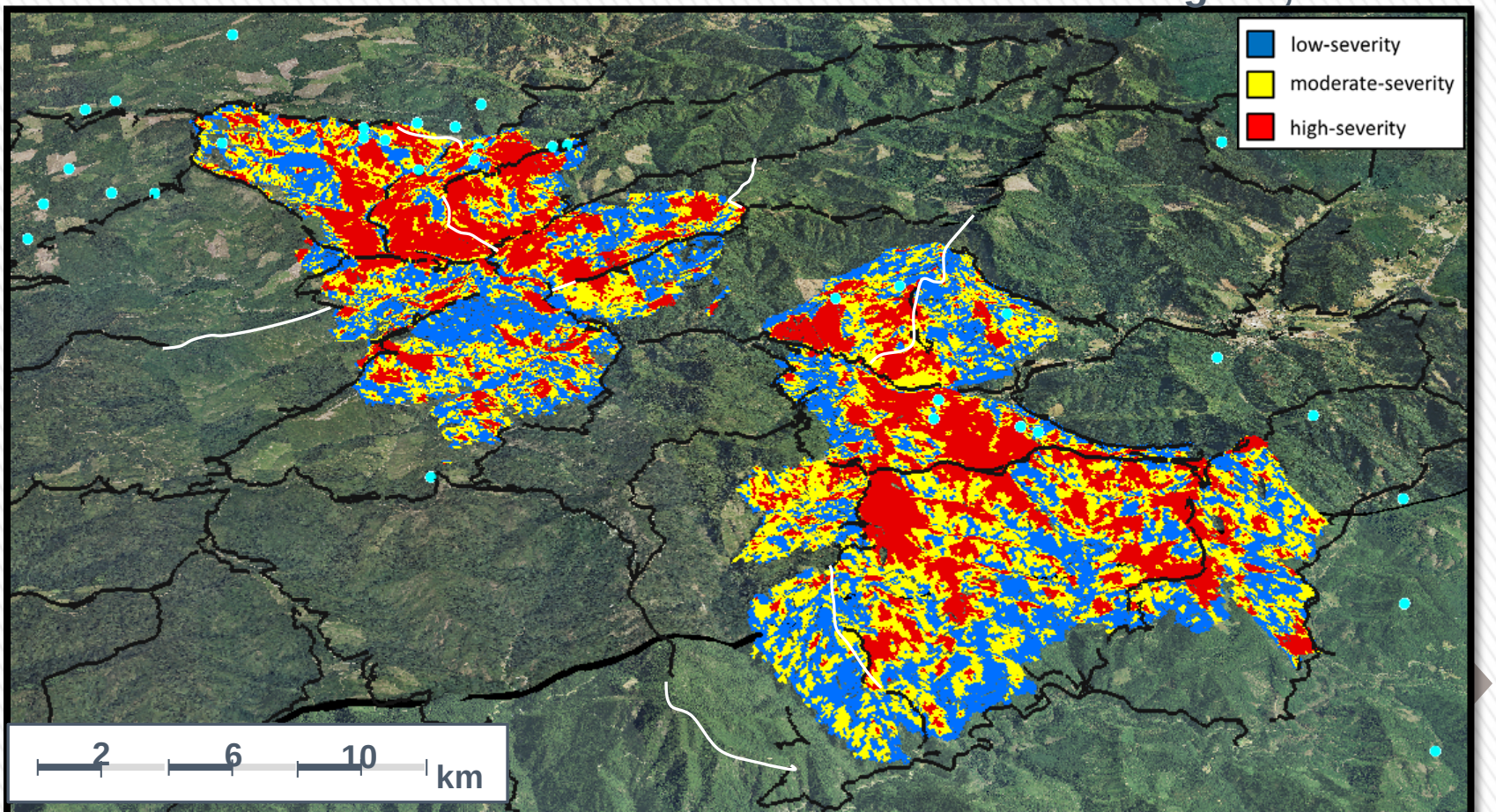

Cumulative area: 17,997 ha

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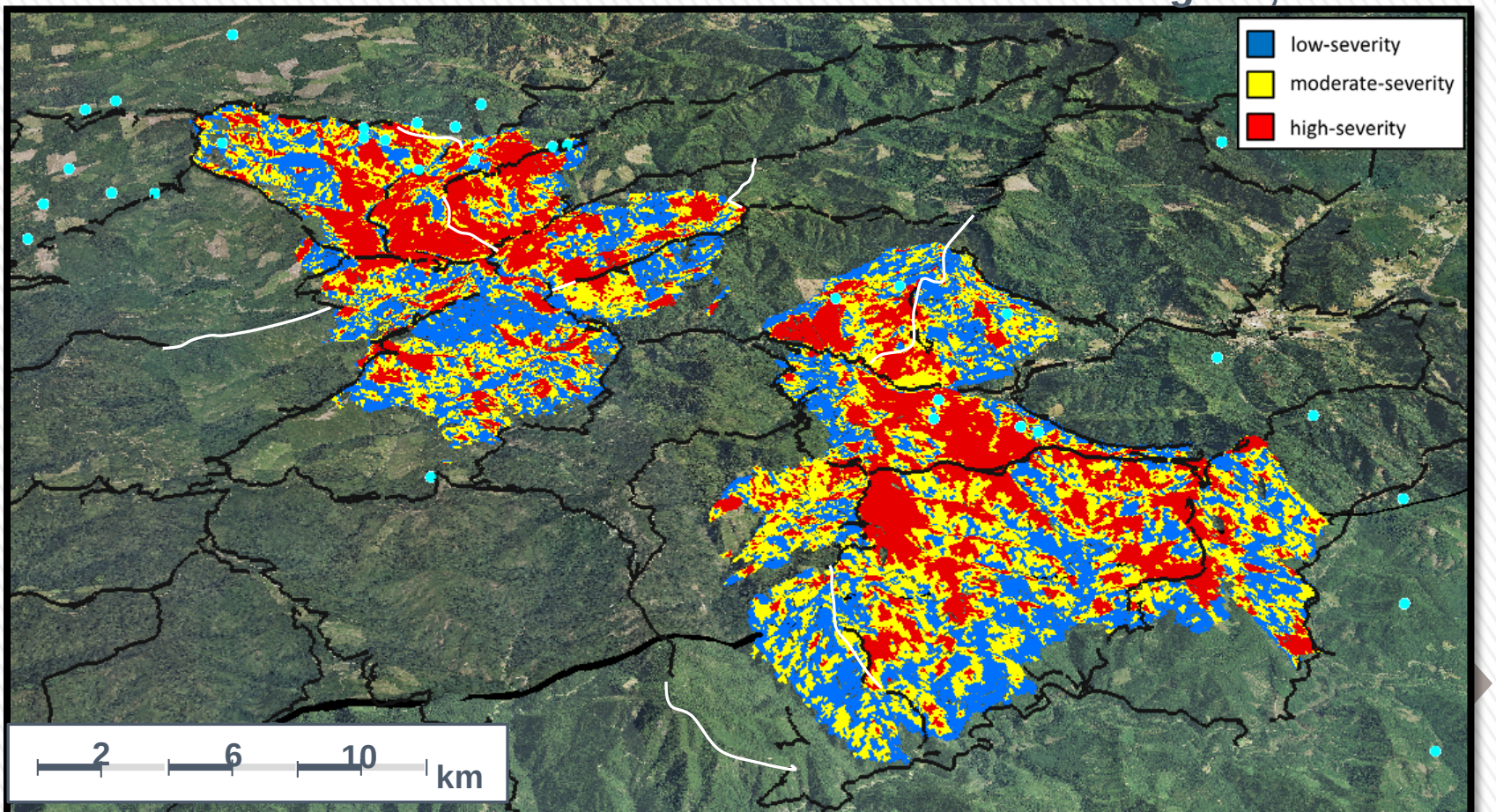
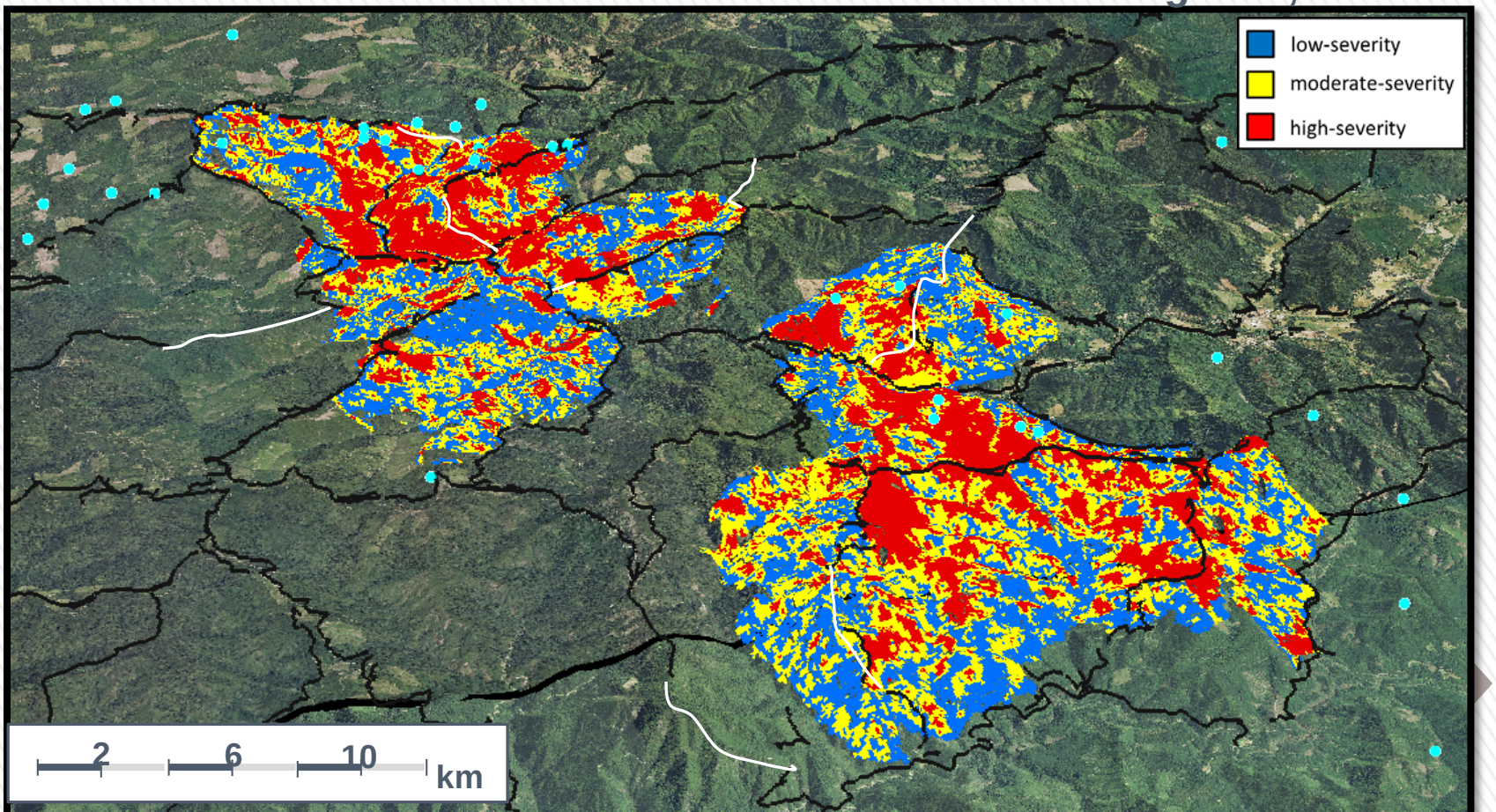


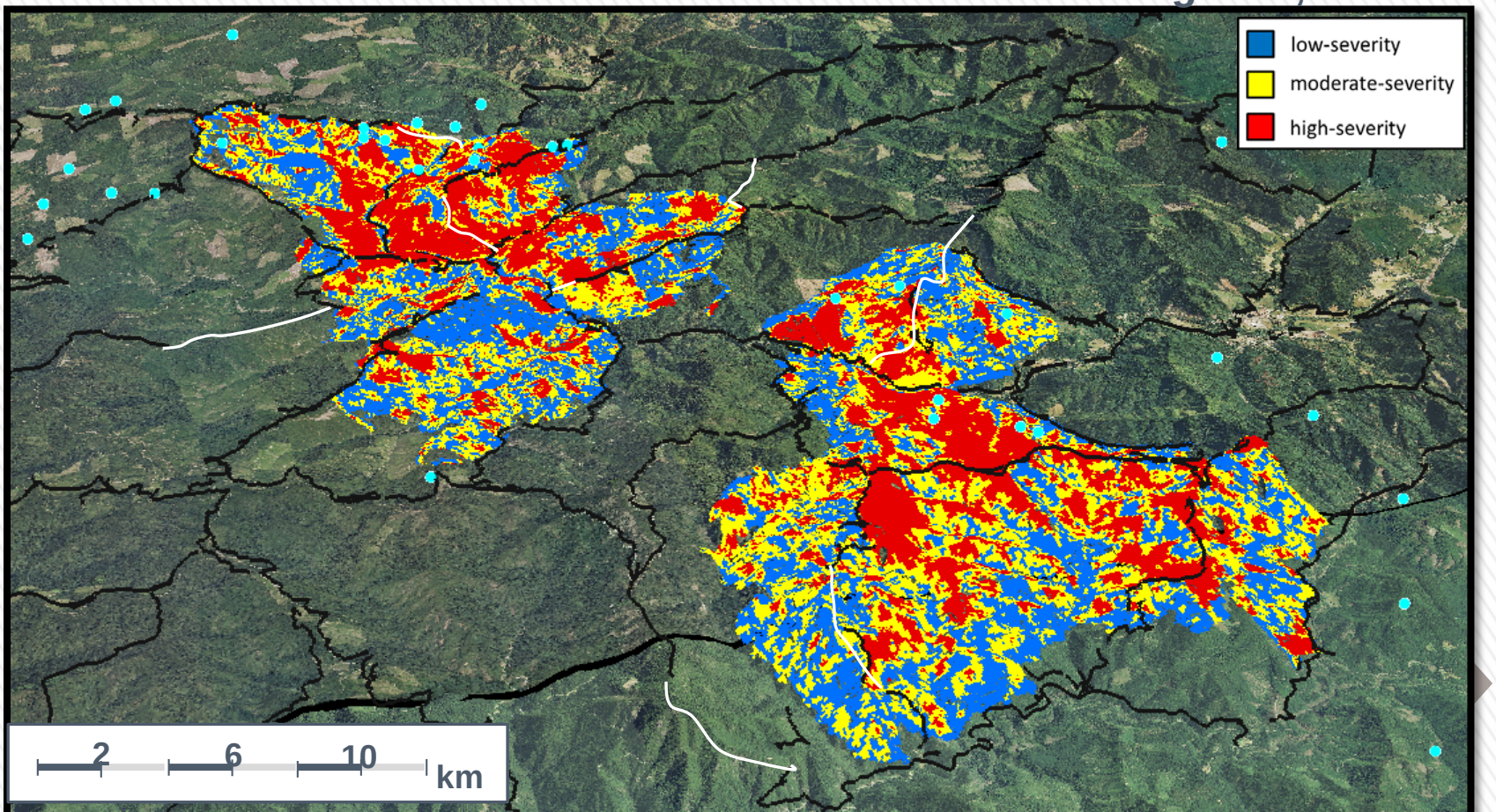
Cumulative area: 18,386 ha

Aug. 10th, 2013



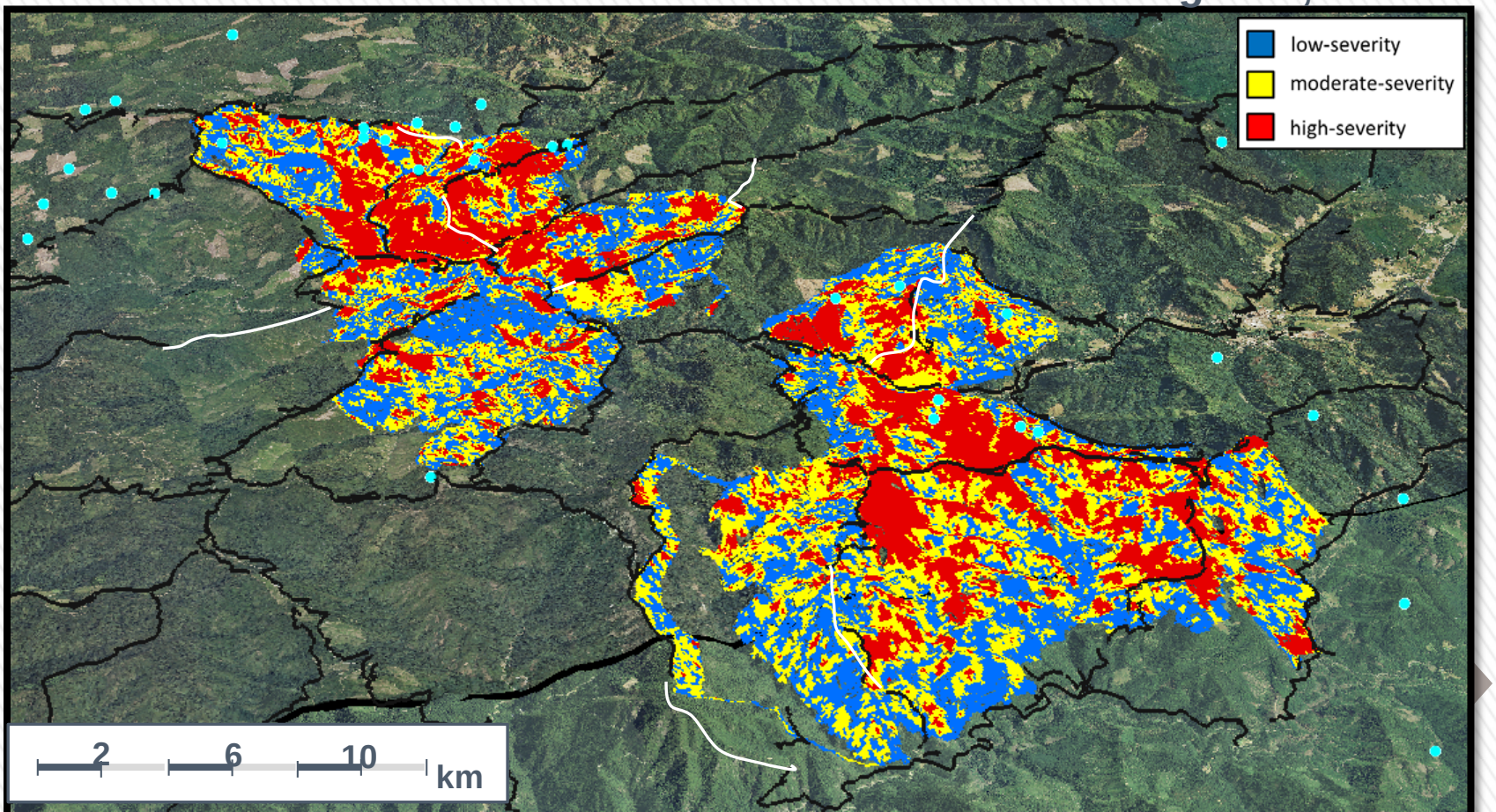
Cumulative area: 18,415 ha

Aug. 12th, 2013



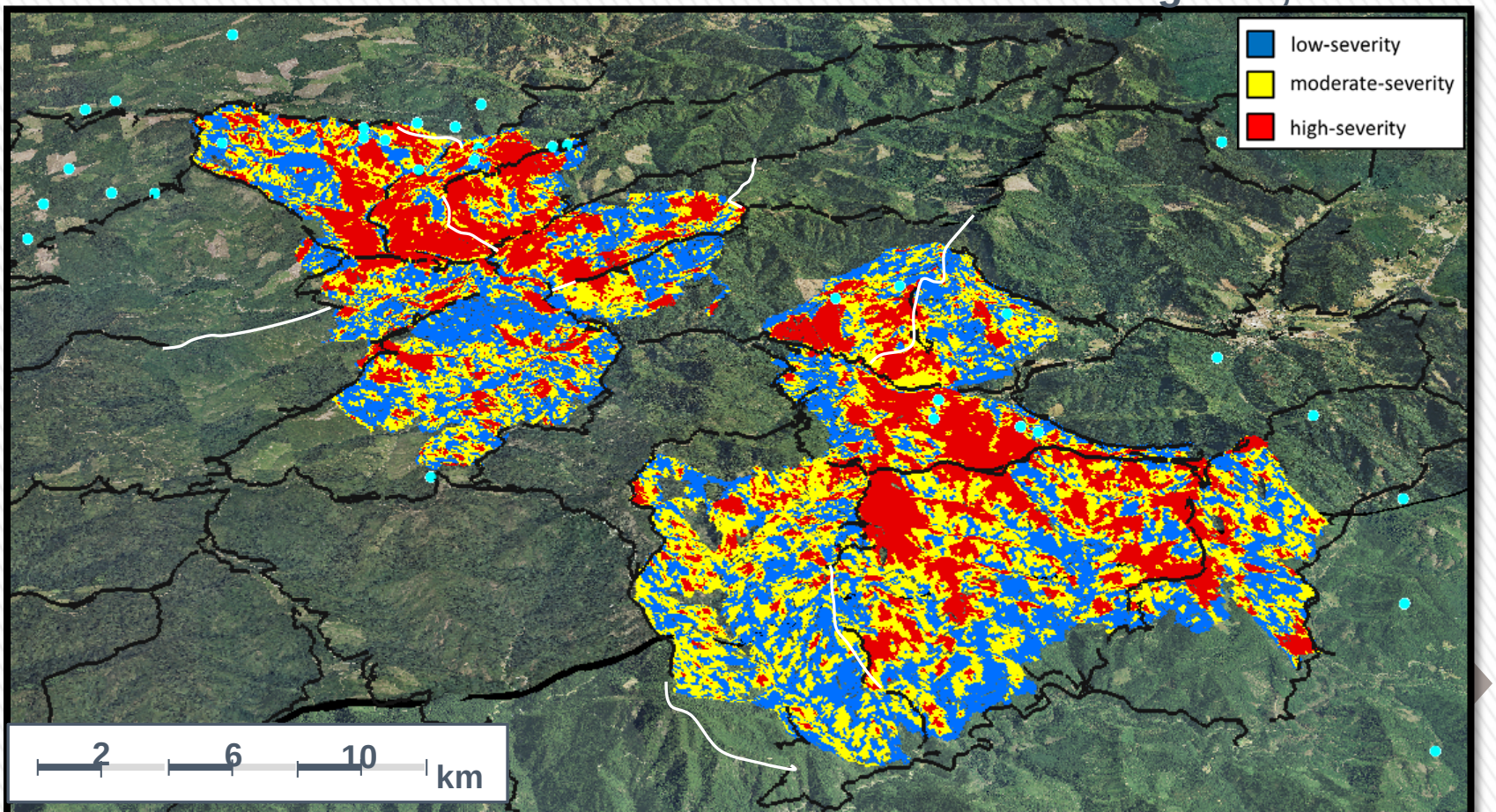
Cumulative area: 18,986 ha

Aug. 15th, 2013



Cumulative area: 19,590 ha

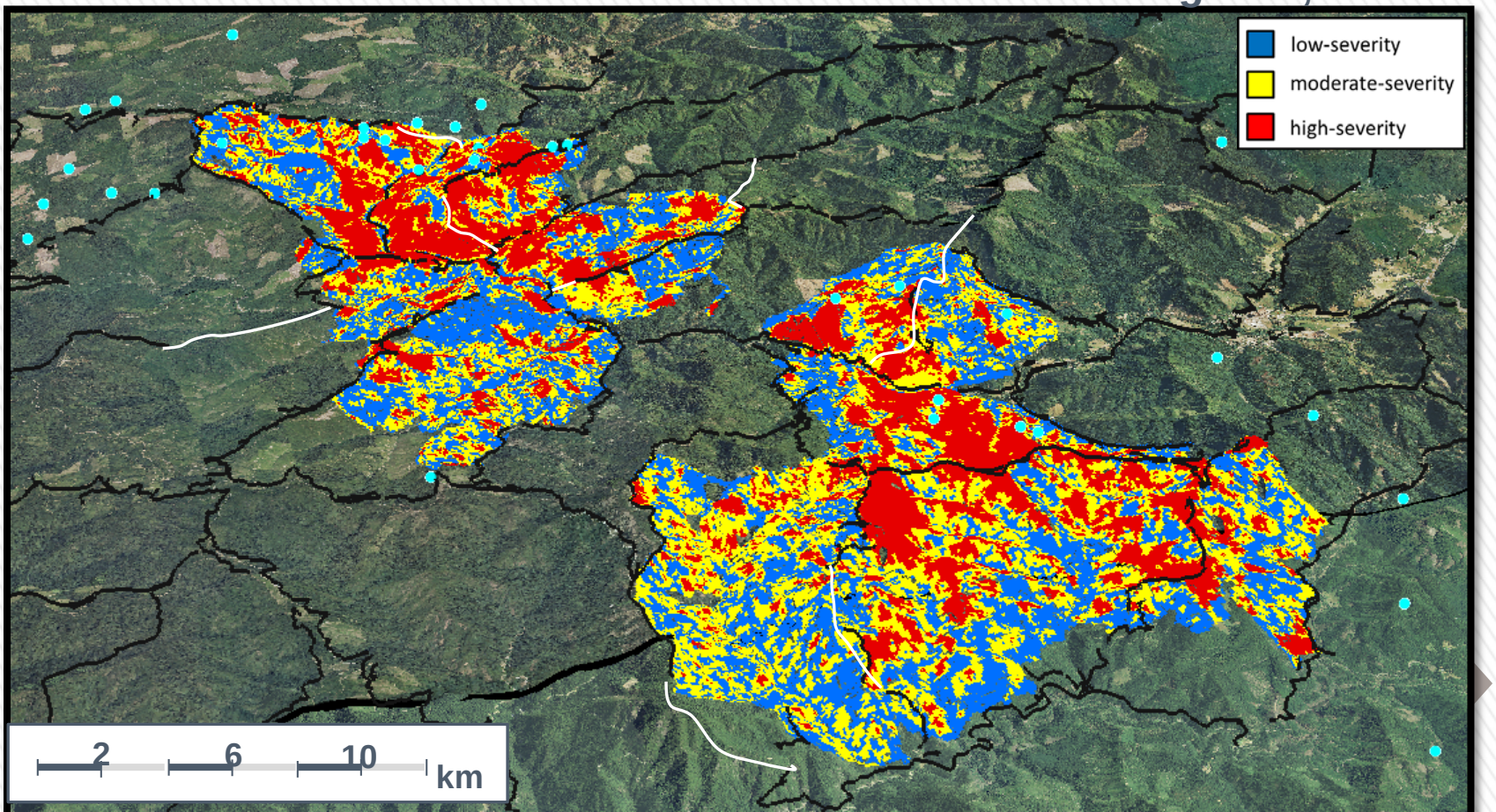
Aug. 18th, 2013



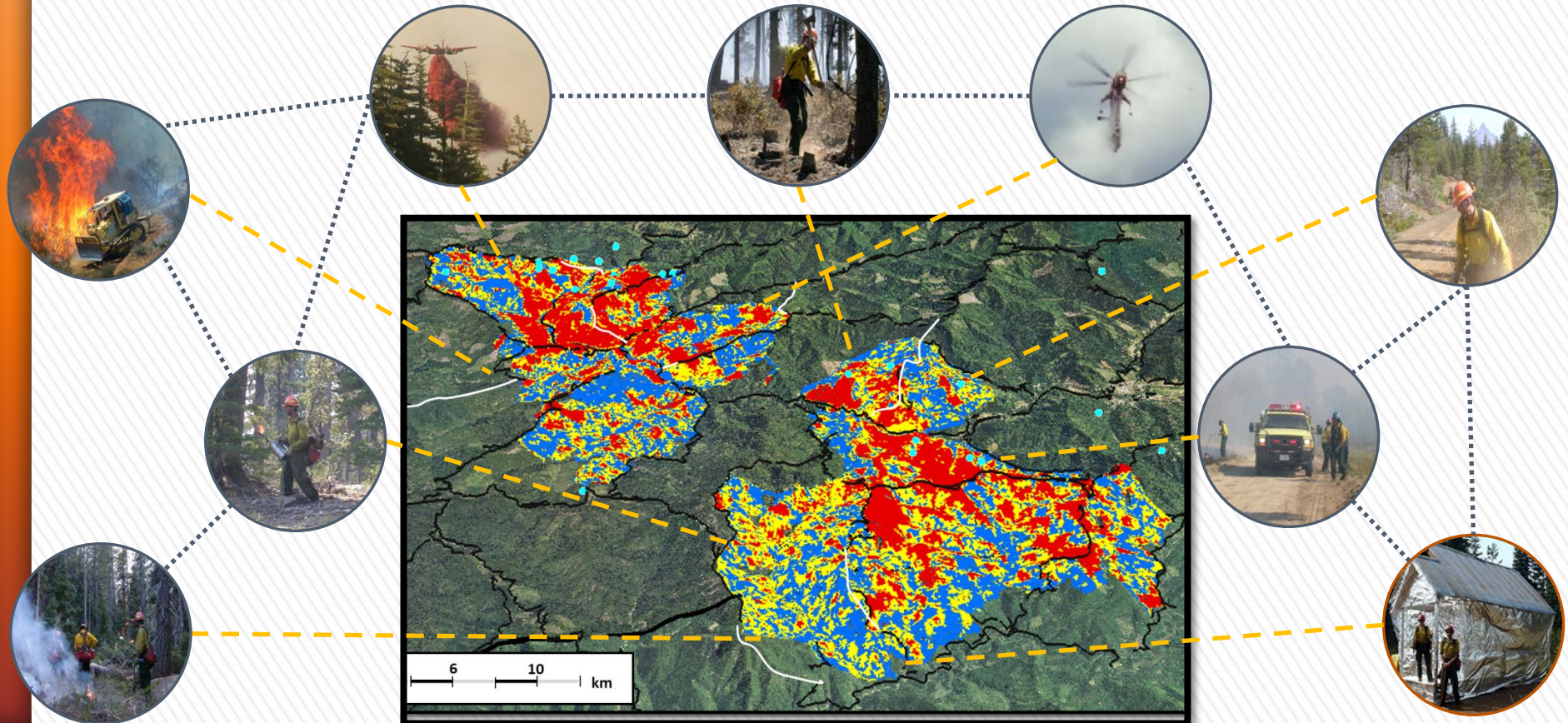
Final perimeter

Cumulative area: 19,709 ha

Aug. 20th, 2013



IMTs can focus efforts on safe tactical response



Risk reduction formula

- Large firesheds WILL burn – plan r-PODs
- With favorable ignitions and weather
  - Prescribed fire - aggressively
- Last month's fire is this month's fuel break
  - Future containment lines and suppression (?)
  - **Burn the burn**

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Bottom Line –
True Cost of Fire Management

1. Wildland fire as a reality
2. Fire behavior and predictability
3. Building resistance and resilience – no cost
   - Sustainable forest management
   - Proactive identification and preparation of firesheds
4. Wildland fire is a tool IF…
   - Site preparation – IT'S ABOUT THE FUELS, TOO!
   - Prescribed burning/spreading - decisive
     - Greater tree/stand survival and resilience
   - Social and economic considerations for fire porosity

Accept, Anticipate, Adapt

Bottom Line – Collaboration

1. Adaptive management
2. Information is no longer limited
3. We have more tools than ever with which to work on solutions
   - > Collaboratives
   - > Public and private lands outreach
4. Change is difficult
   - > Risk making mistakes
   - > Doing nothing risks everything

Thank you

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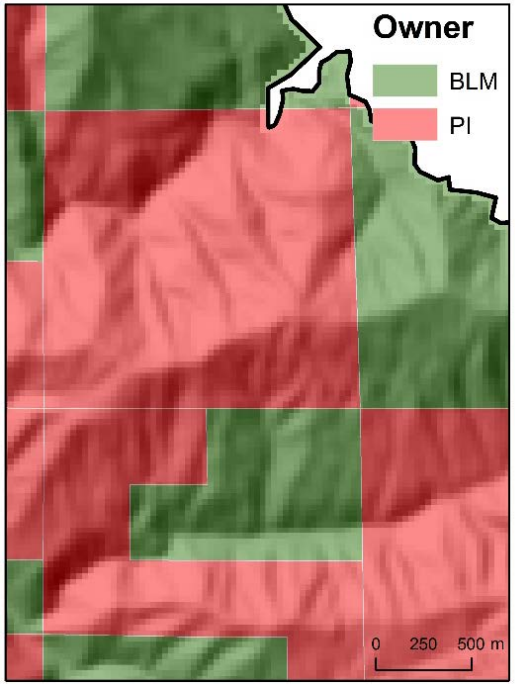
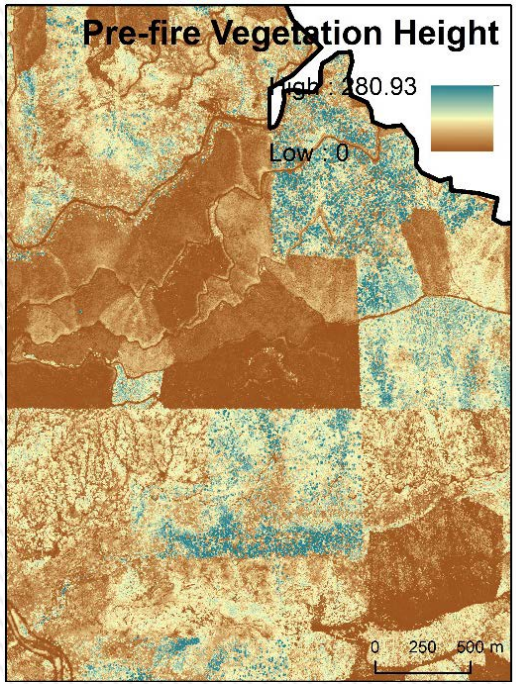
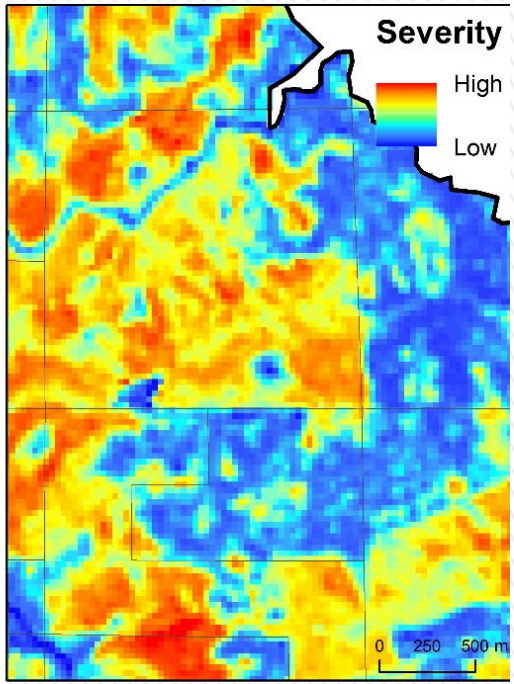
Next steps – cross-boundary fire risk transmission



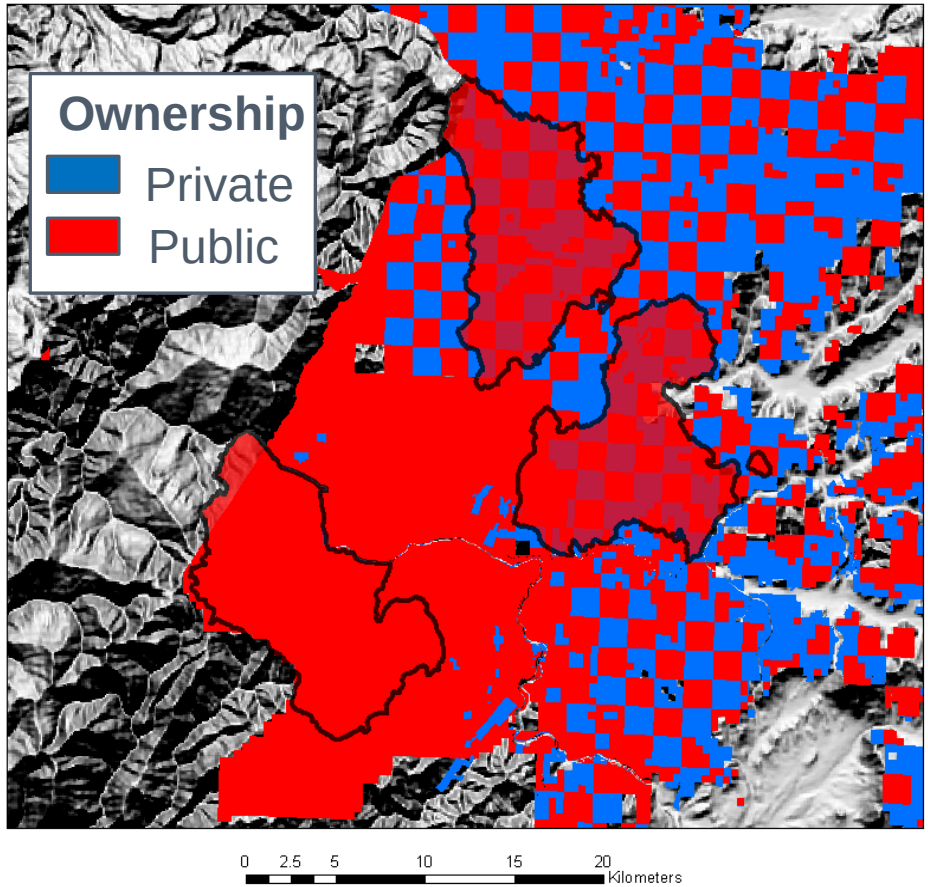


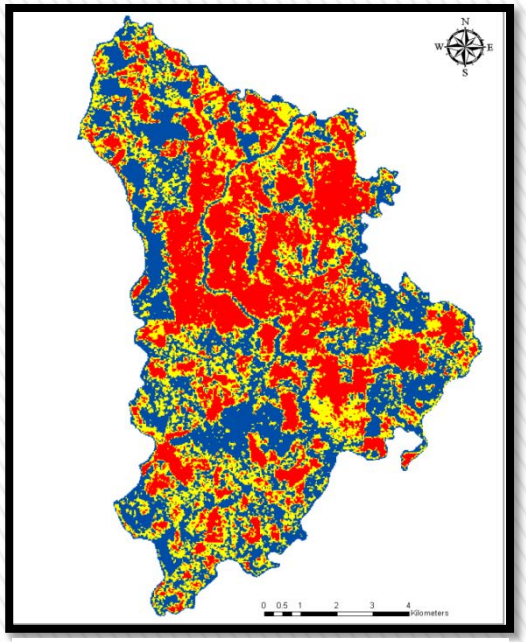


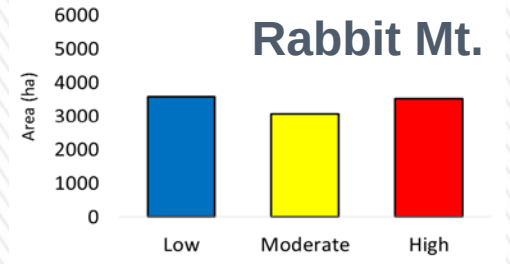
Douglas Complex fire, southern Oregon

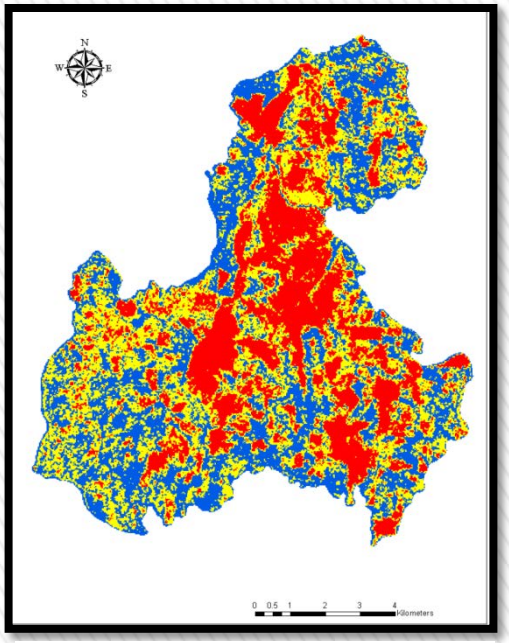
Most variable effects observed in fire were on public lands

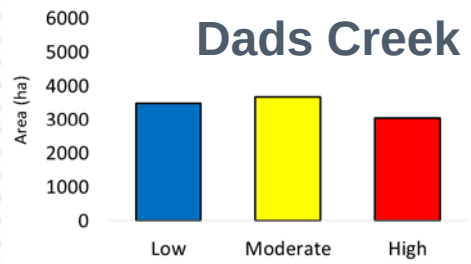
Michael Hoe, MS thesis
Krisann Kosel, BLM Roseburg
Robert Kennedy, OSU Geosciences

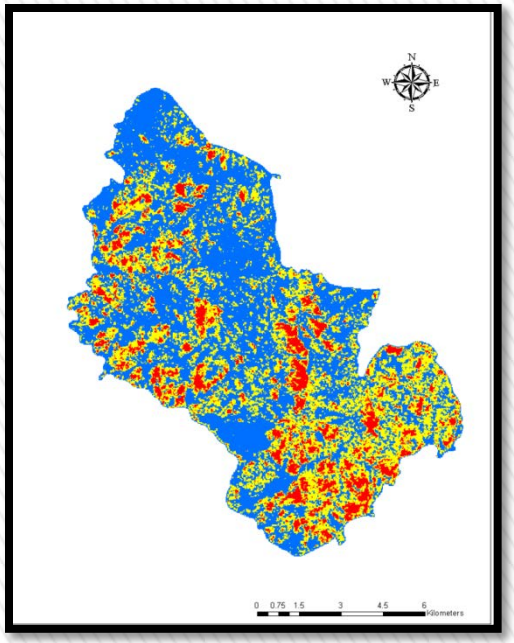


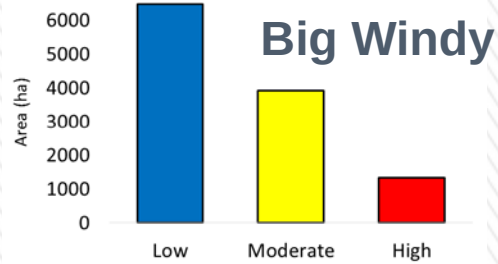

N
W
E
S
0 0.5 1 2 3 4
Kilometers


Rabbit Mt.
Area (ha)
6000
5000
4000
3000
2000
1000
0
Low
Moderate
High


N
W
E
S
0 0.5 1 2 3 4
Kilometers


Dads Creek
Area (ha)
6000
5000
4000
3000
2000
1000
0
Low
Moderate
High


N
W
E
S
0 0.75 1.5 3 4.5 6
Kilometers

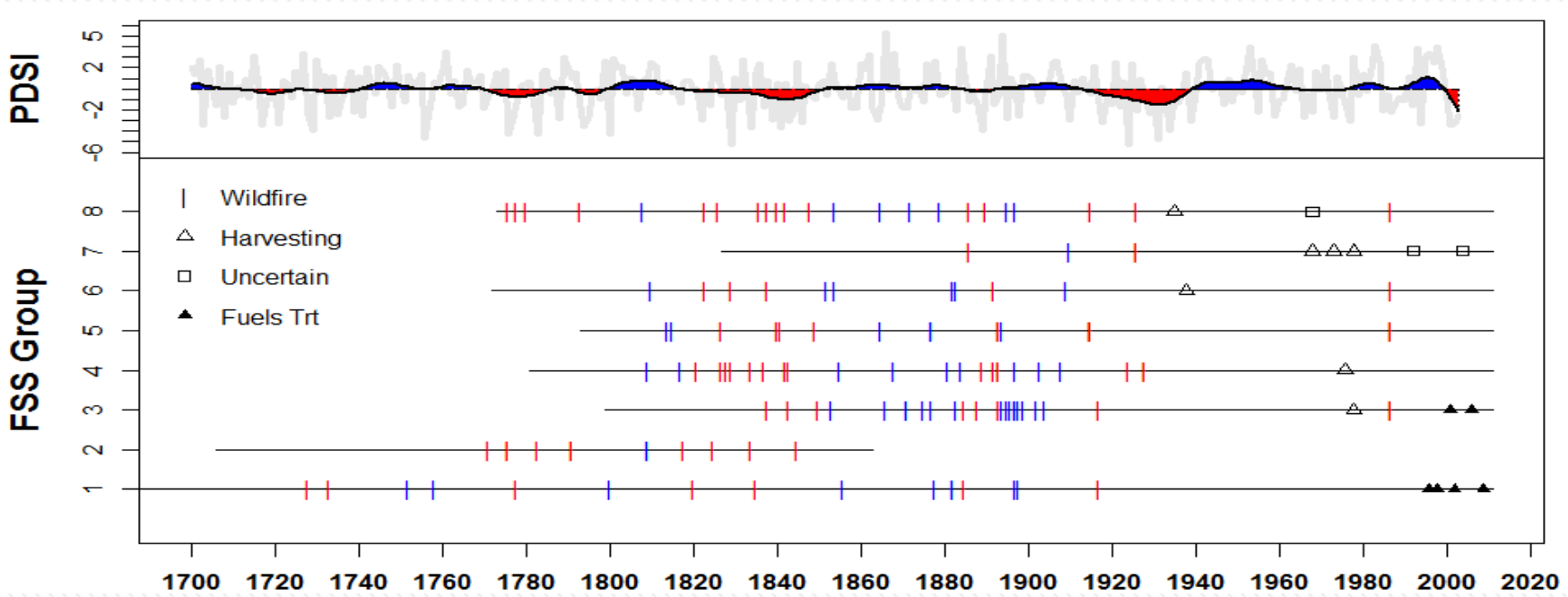

Big Windy
Area (ha)
6000
5000
4000
3000
2000
1000
0
Low
Moderate
High

Conclusions

- Ignitions occur across all ownerships
- Fire weather the most important driver of fire severity
  - Stand age second most important, then ownership
- Older forests without treatments (public lands) buffer fire effects across landscapes
- Transition to timber production will increase landscape-level fire severity

Conclusions

- Spatial pattern of fuels/forest structure, rather than absolute fuel loads, may drive severity response
- “All hands, all lands” approach means private industrial forestry may need to update their management practices
- Fire-prone landscapes would benefit by defragmentation of ownership



Fire scars in wet vs. dry climatic cycles

Applegate Watershed