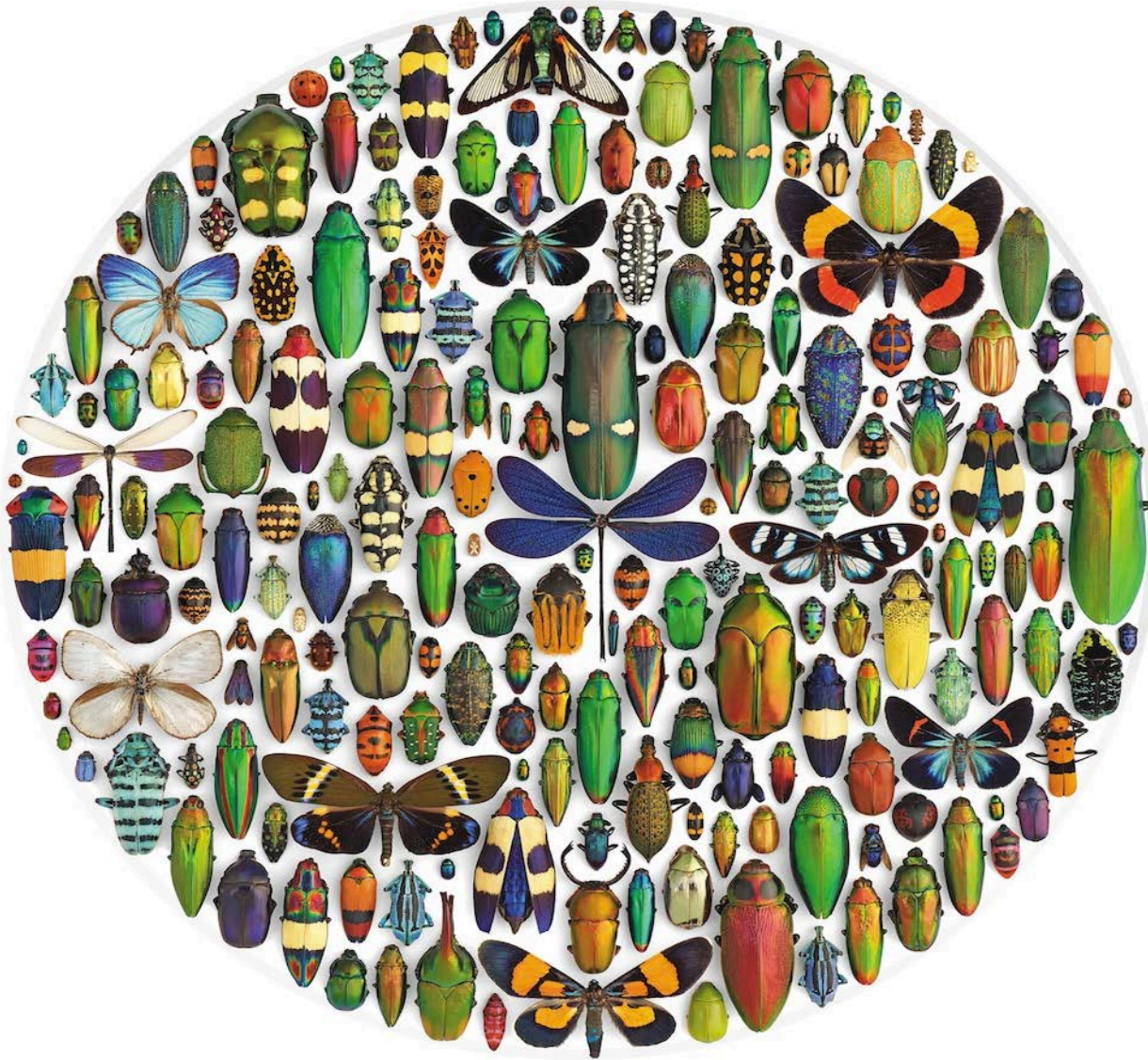


IF PYRODIVERSITY BEGETS BIODIVERSITY, WHY AREN'T WE MANAGING FOR IT?

Dominick A. DellaSala, Ph. D., Chief Scientist



BIODIVERSITY IS THE FABRIC OF LIFE ON EARTH



Scale Matters

Context Matters

Process Matters

Evolution Matters

Ecosystems Matter

**Perspectives Matter
(vegetation vs. fuels!)**

IN NATURE'S PERFECTION IS VARIETY, THE SPICE OF LIFE



- **Alpha Diversity** – native species richness at site/stand level
- **Beta Diversity** – native species turnover across environmental gradients
- **Gamma Diversity** – Σ of regional biodiversity parts (alpha + beta = gamma)
- **KS and Sierra regions, shaped by fire, globally outstanding (DellaSala et al. 1999)**

DESTROYED BY FIRE OR BORN AGAIN?



**Wildfires
Destroy
Green
Forests**



GRIZZLY PEAK – HIGH ALPHA DIVERSITY

DESTROYED BY BEETLES?

RESTORED FOR WOODPECKERS



M. Bond

D. Kulakowski

LESS SUSCEPTIBLE TO SUBSEQUENT FIRE & HIGH BETA DIVERSITY

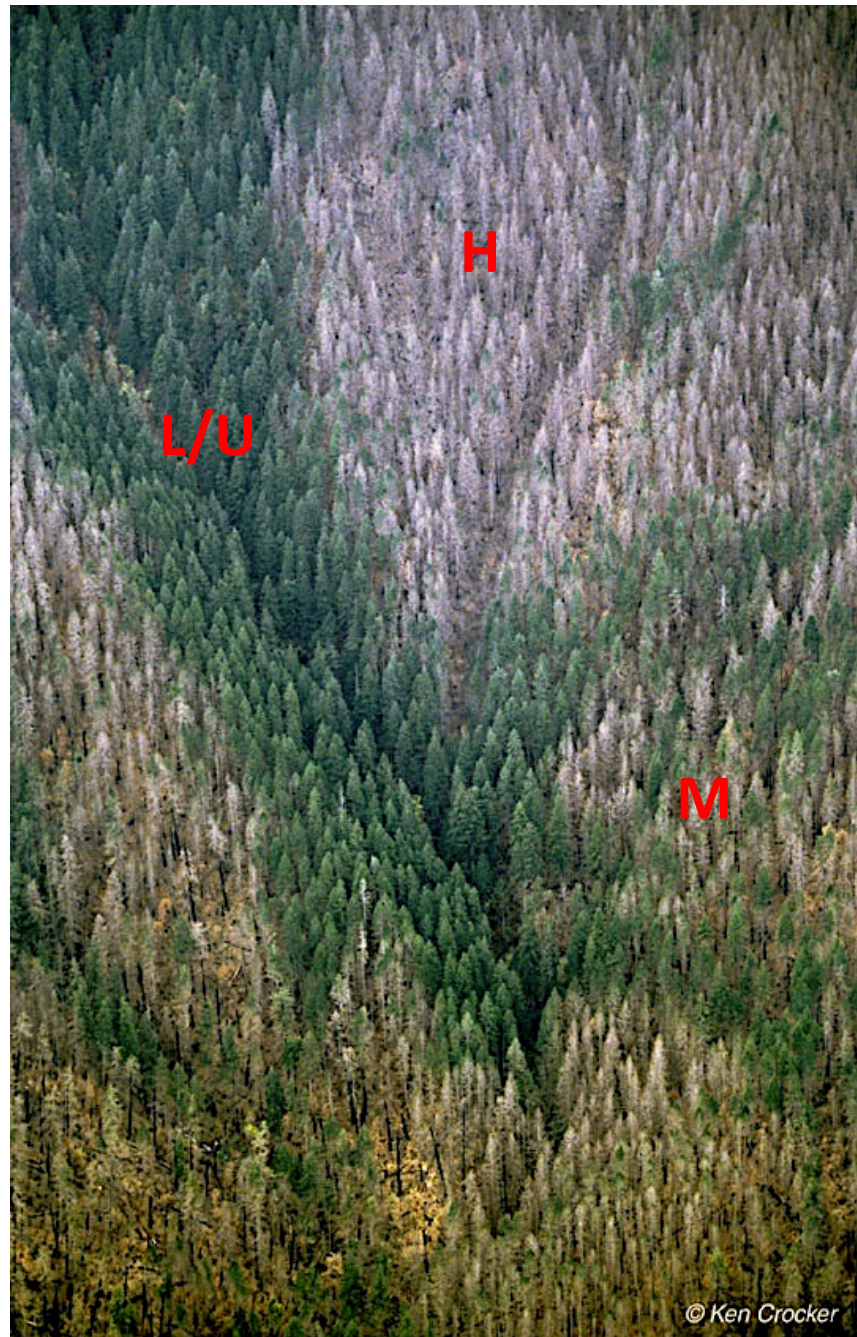
FIRE INTENSITY BEGETS BURN SEVERITY



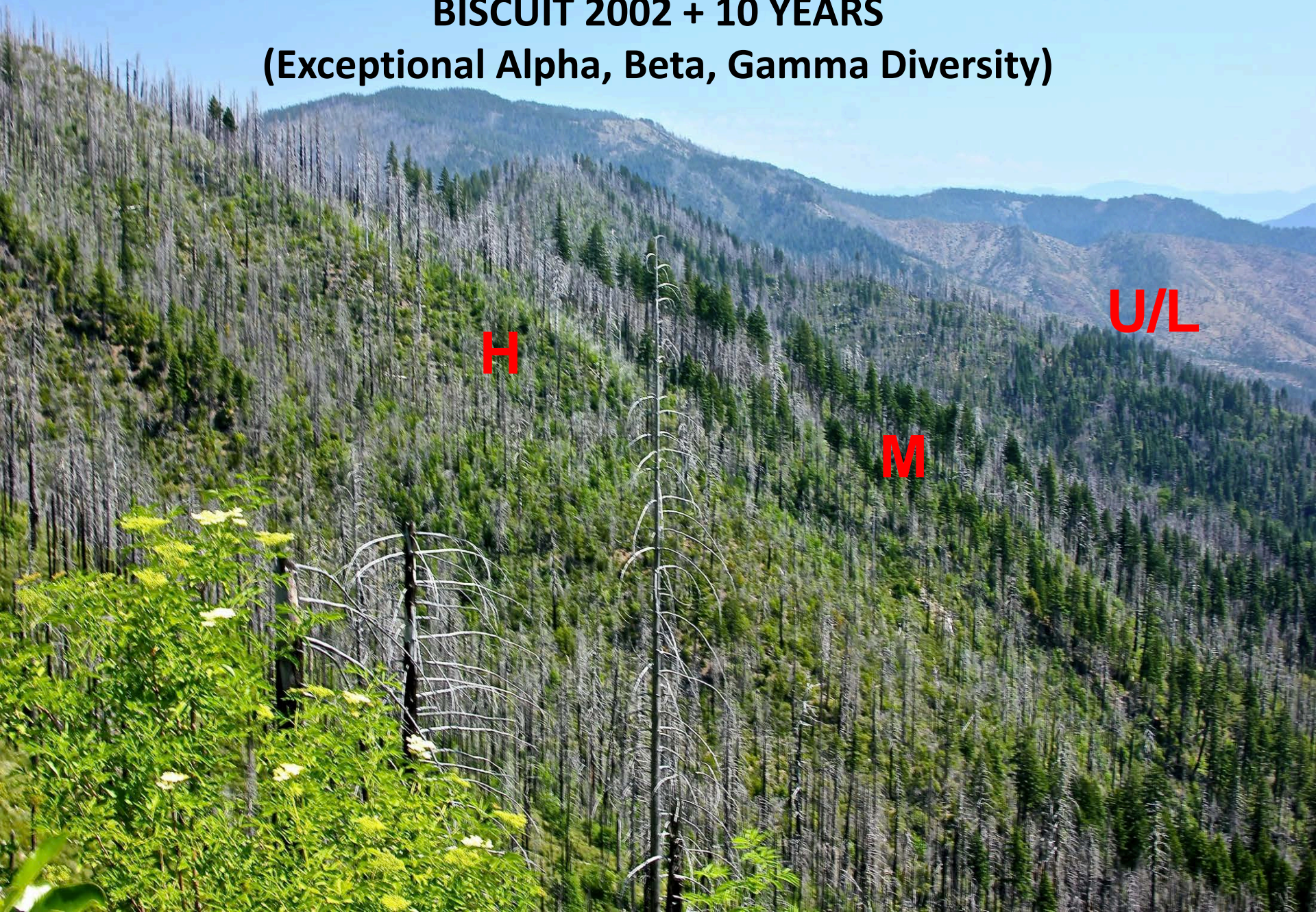
LOW

MODERATE

HIGH



**PYRODIVERSITY BEGETS BIODIVERSITY:
BISCUIT 2002 + 10 YEARS
(Exceptional Alpha, Beta, Gamma Diversity)**



H

M

U/L

BLACKENED FORESTS MATTER!

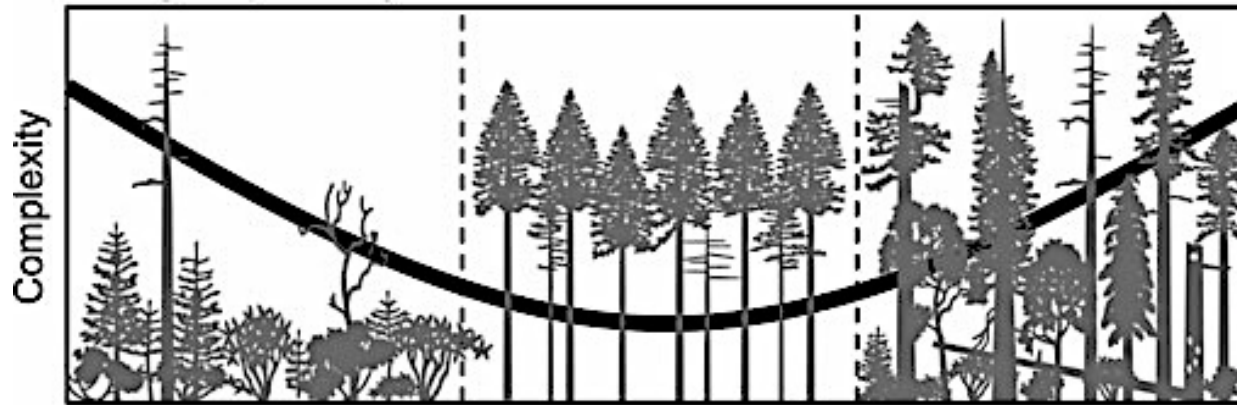


© Ken Crocker



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SNAG FORESTS (HIGH SEVERITY) ALPHA DIVERSE: NATURE'S PHOENIX



Donato et al. 2012



JUST BECAUSE CONIFERS ARE DELAYED DOESN'T MEAN IT'S NOT BIODIVERSE

**EARLY SERAL
QUALITY MATTERS**



HIGH SEVERITY PATCHES

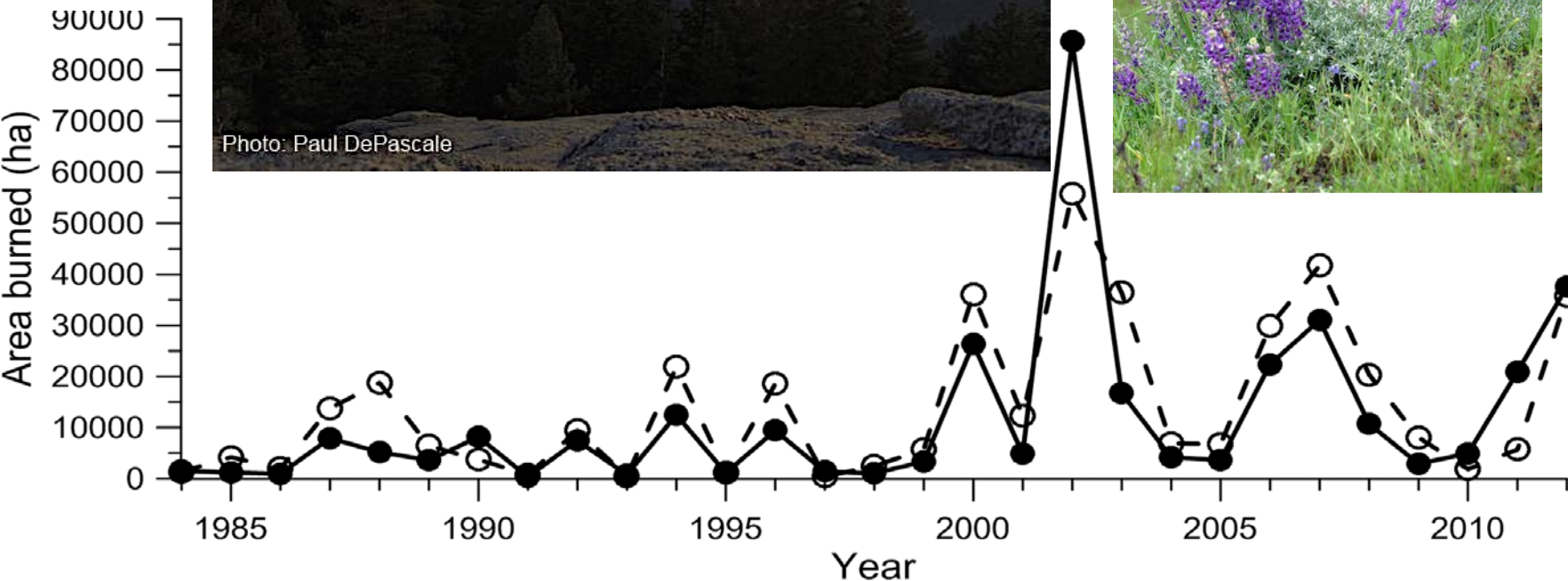


RECOVERING CLEARCUTS

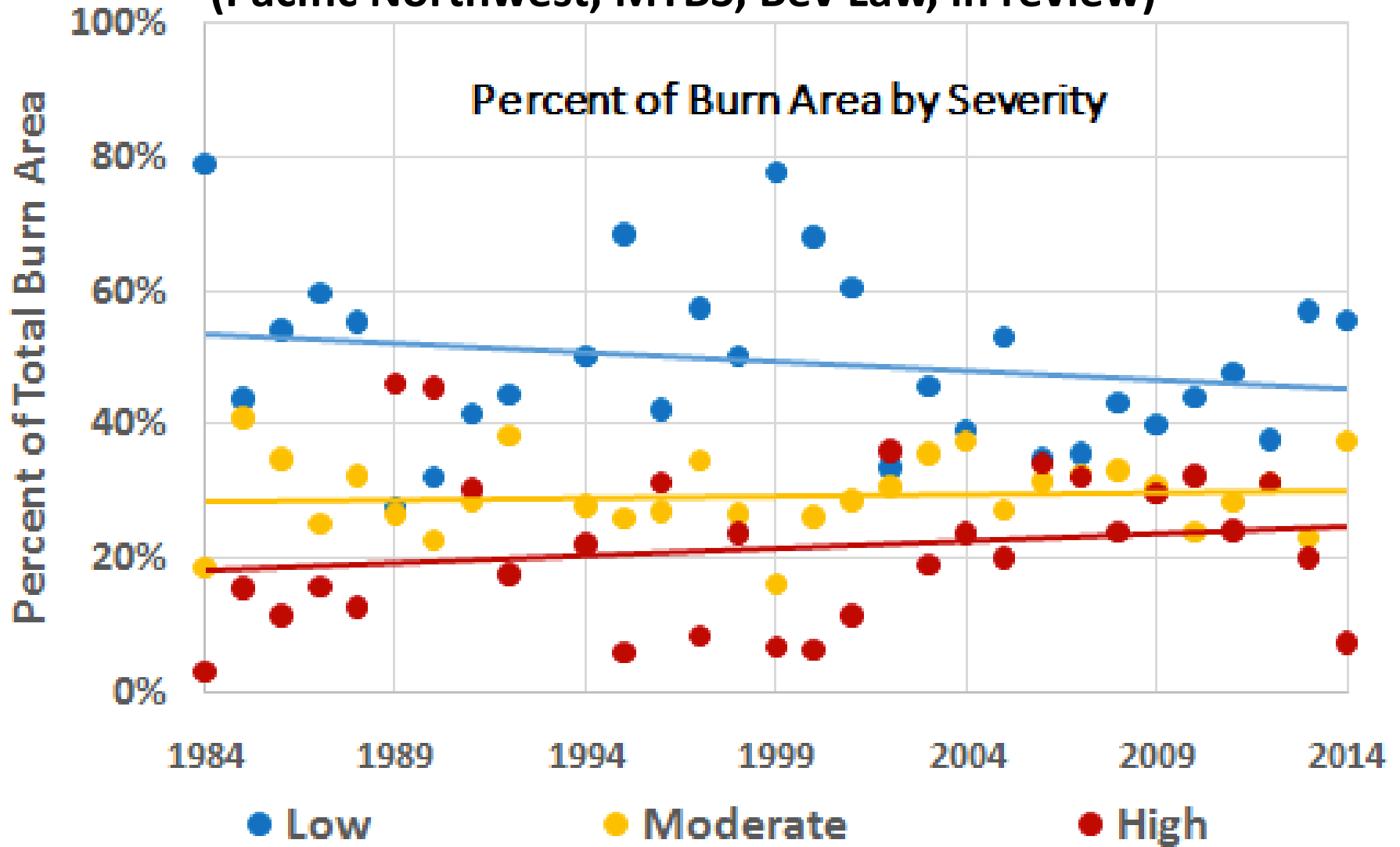
| | | |
|---|----------|-------|
| Legacies | +++ / ++ | - / + |
| Snags | +++ / ++ | - / + |
| Down logs | +++ / ++ | - / + |
| Understory | +++ / ++ | + |
| Heterogeneity | +++ / ++ | - |
| Time in early seral (before canopy closes) | +++ / + | + |

TOO MUCH OF A GOOD THING: IS HIGH SEVERITY INCREASING? (Western Mixed Conifer, PIPO forests)

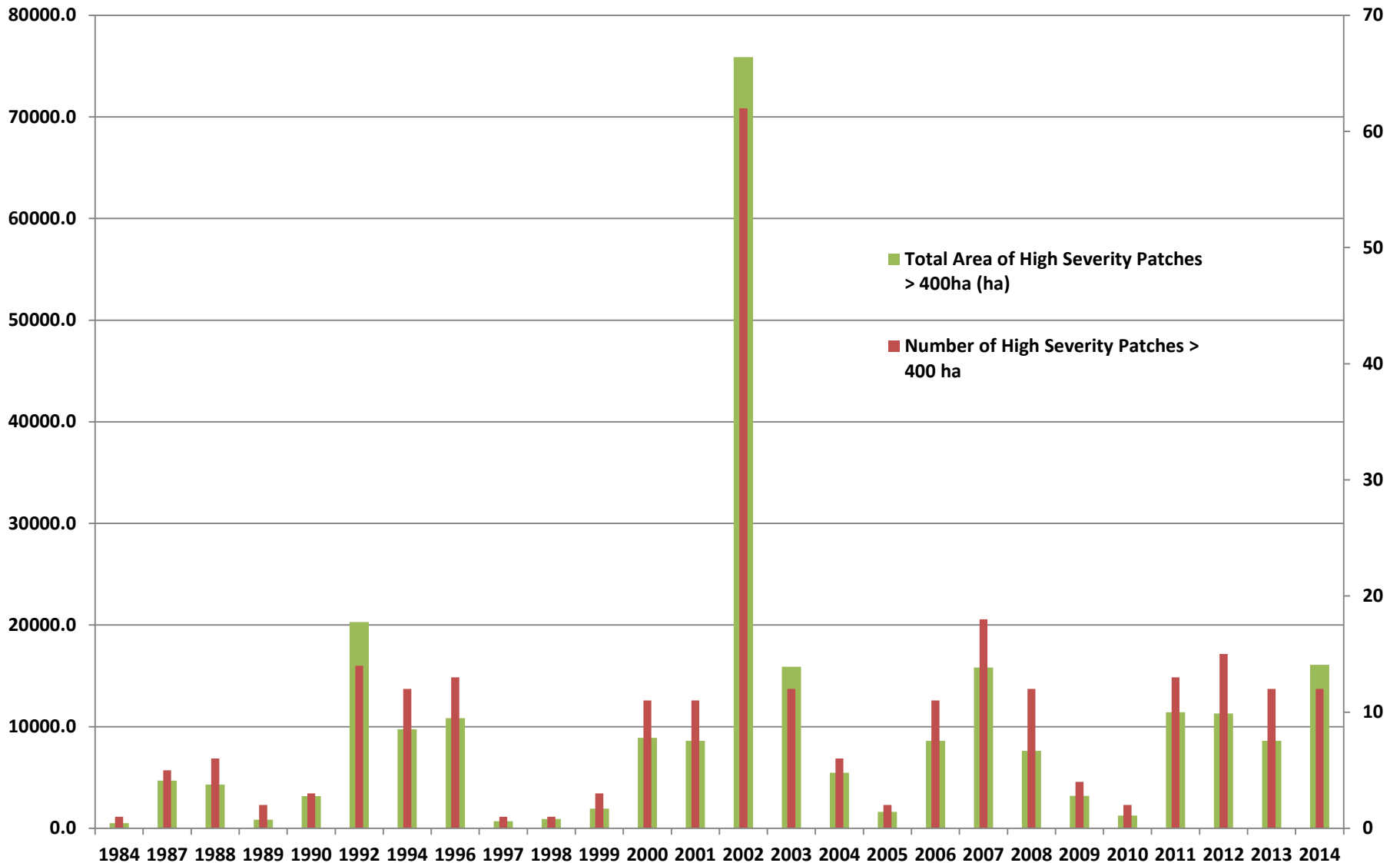
Source: Baker 2015



IS HIGH SEVERITY INCREASING? (Pacific Northwest, MTBS, Bev Law, in review)



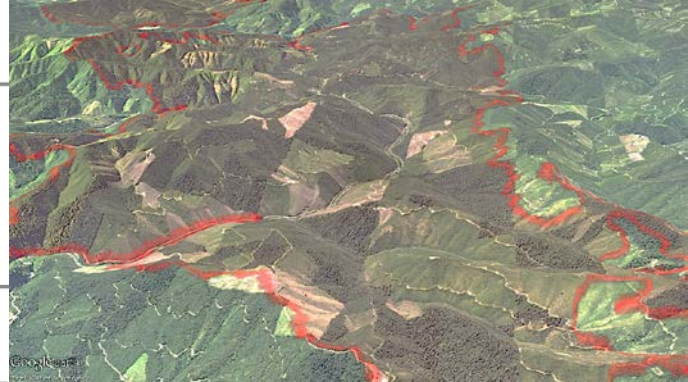
ARE HIGH-SEVERITY PATCH SIZES INCREASING? (NWFP AREA, DellaSala et al. in prep)



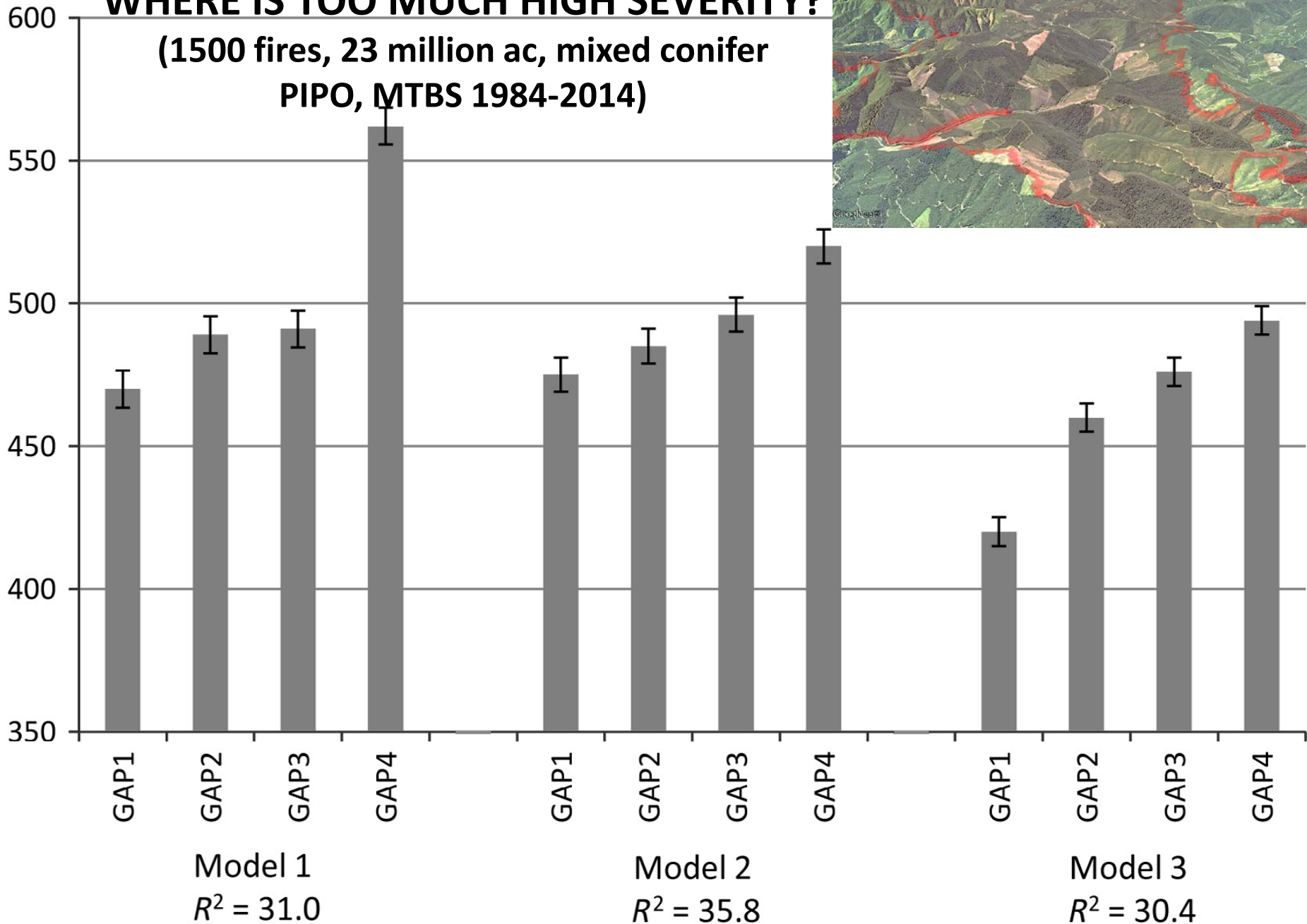
Mann Kendall Tau (area) = 0.012, p = 0.95; Tau (number) = 0.04, p = 0.79

WHERE IS TOO MUCH HIGH SEVERITY?

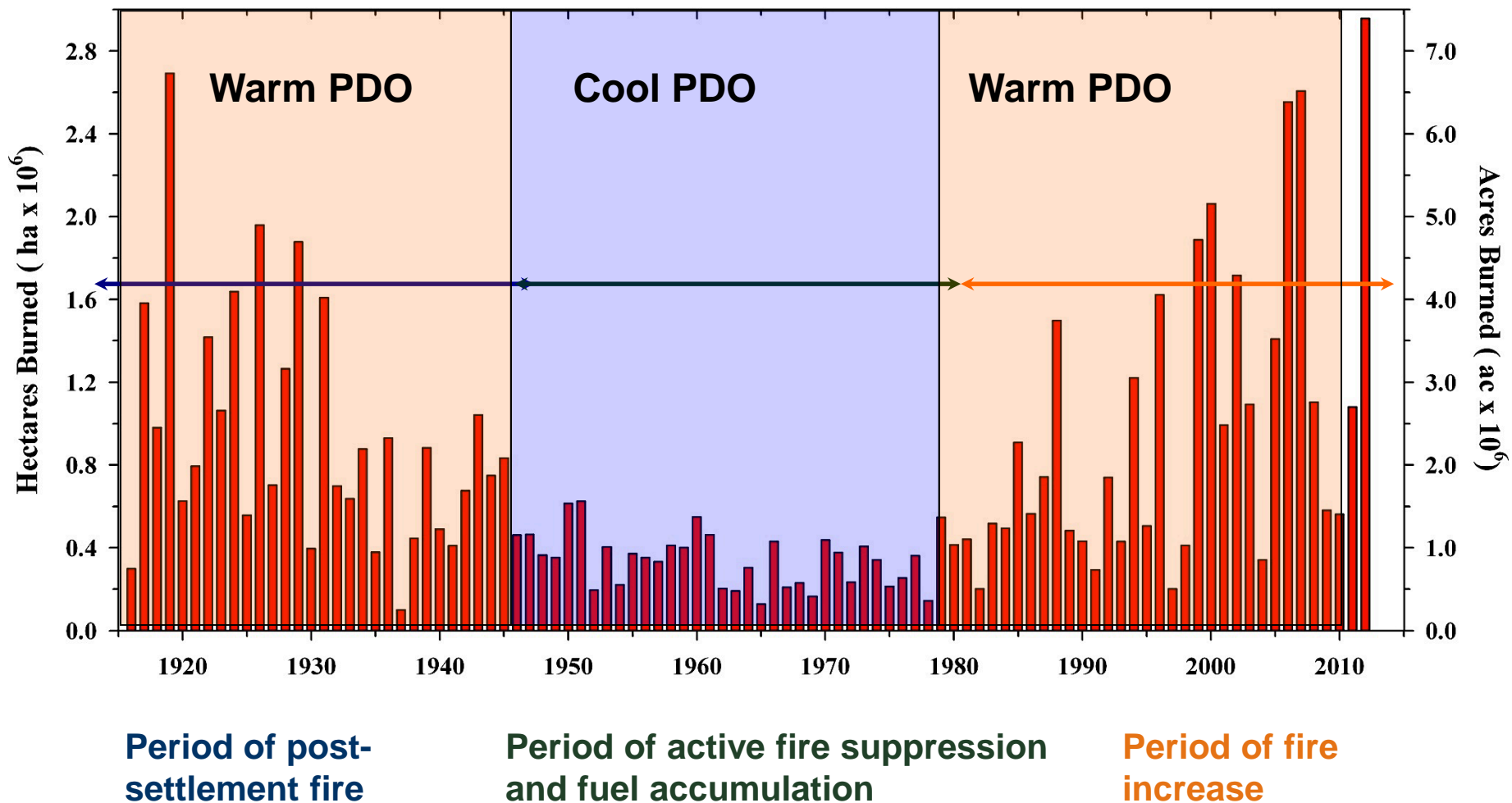
(1500 fires, 23 million ac, mixed conifer
PIPO, MTBS 1984-2014)



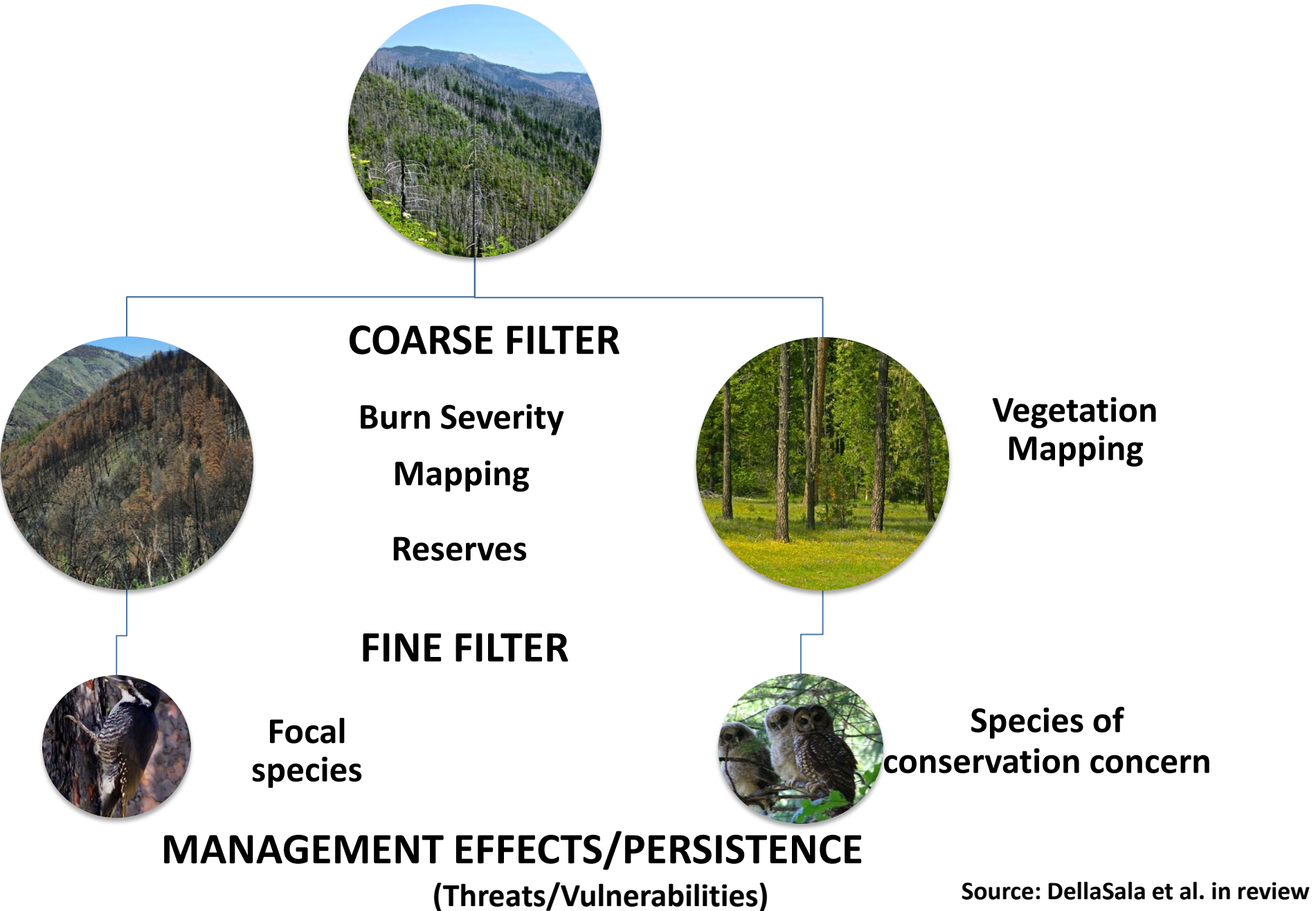
RdNBR



HOW DOES CLIMATE INFLUENCE WILDFIRE SEASONS?



2012 PLANNING RULE FOR ECOSYSTEM INTEGRITY & BIODIVERSITY



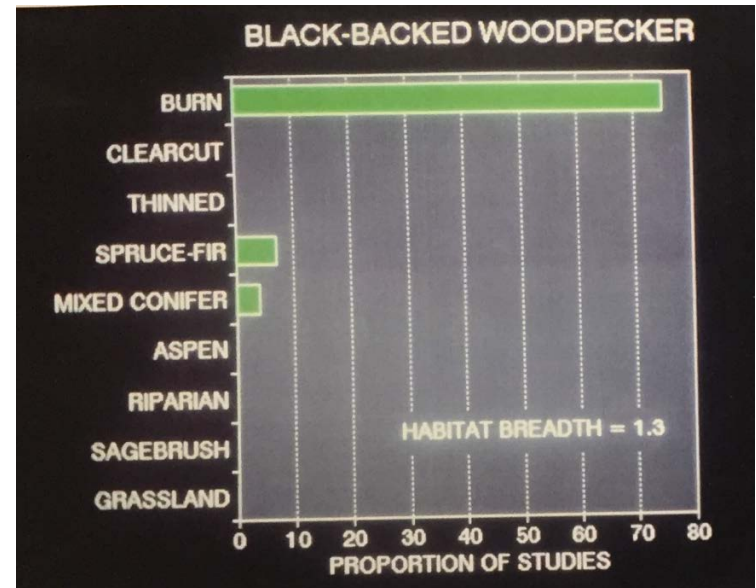
“To a Black-backed Woodpecker, recovery began the moment after a fire.” R. Hutto



Photo: C. Hanson

HIGH-SEVERITY FIRE CANDIDATE FOCAL SPECIES

- Snag forest specialist for 5-8 years post-fire (decline in food?)



Source: Hutto 1990, Hanson & North 2008; Siegel et al. 2013

SPECIES OF CONSERVATION CONCERN



- California and Mexican Spotted Owls resilient, even severely burned
- NSO– only 1 empirical study; foraging habitat in models is scored as zero habitat (not so); clean dataset (no salvage, barred owls)?
- Shift territories, forage in severe, nest low-moderate (kitchen and bedroom)
- What was population doing before fire, territory quality pre fire, salvage, barred owls (cause vs. effect?)
- High severity threshold? LSOG outpacing high severity rotations



Source: Bond et al. multiple studies, Odion et al. 2014

RESTORATION PRINCIPLE 1: STOP THE BLEEDING

(Save the Best, Representative Protected Areas – Coarse Filter)

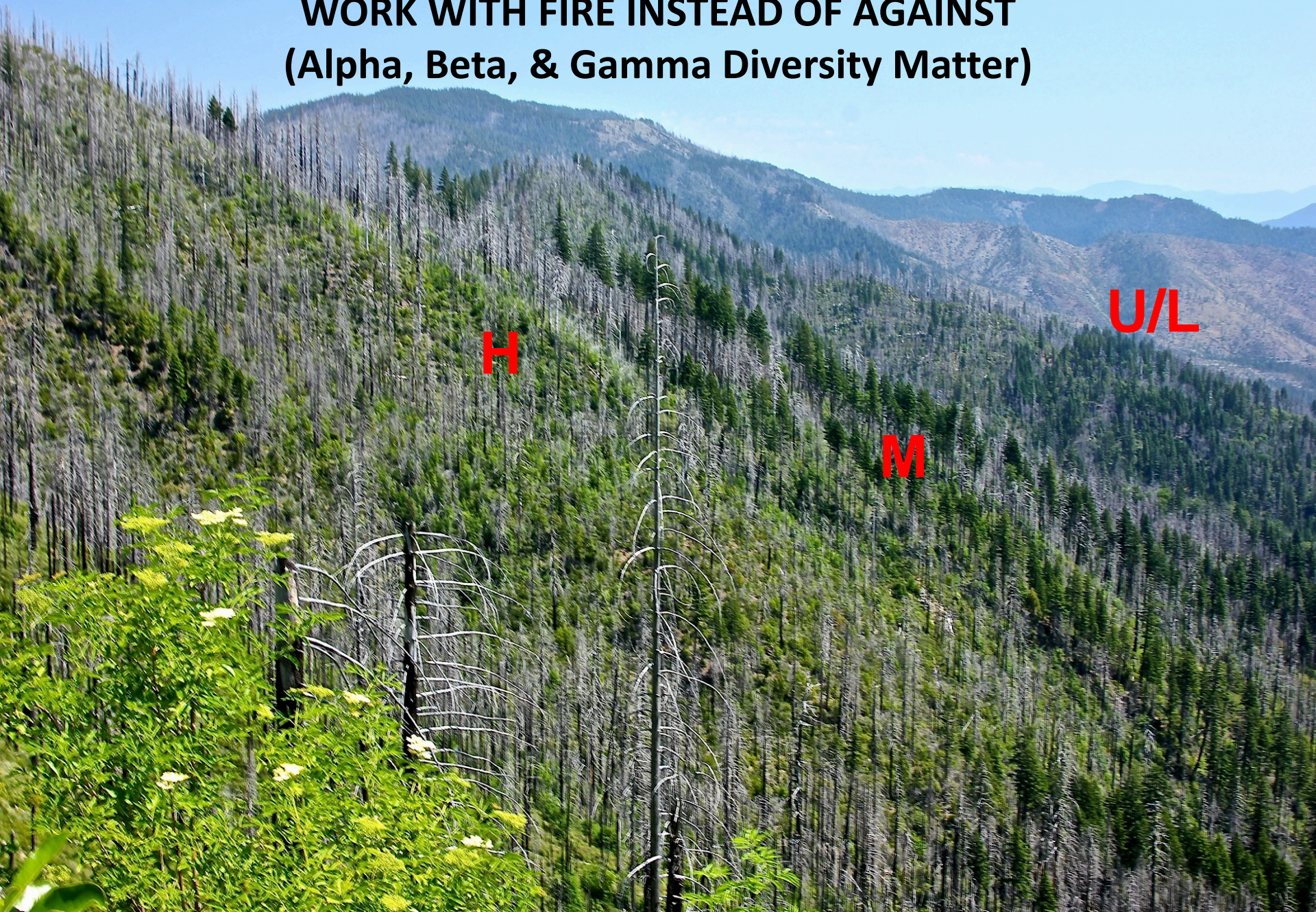


PRINCIPLE 2: SEE THE FOREST FOR MORE THAN THE LIVE TREES

(Alpha Diversity Matters; Complex Structure Matters; Fire in Old Forest ok!)



**RESTORATION PRINCIPLE 3:
WORK WITH FIRE INSTEAD OF AGAINST
(Alpha, Beta, & Gamma Diversity Matter)**



H

M

U/L



RESTORATION PRINCIPLE 4: SCALE & CONTEXT MATTER

Rim fire (257,315 ac perimeter; 29,210 ac
(11%) logged)

- every (39) occupied CSO site; BBWO

Biscuit fire (~495,000 ac perimeter; 127,000
ac **(4%) logged**)

- 70% LSRs, 52% IRAs, 55 watersheds
near Wild & Scenic



Klamath Westside “Fire Recovery” Project
(183,100 ac perimeter; 40,000 ac **(22%)
proposed logged**)

- 6,680 ac in LSR/RRs + 10,000 ac
roadside reserves, IRAs, 7,900 ac
flammable plantations

FUNCTION

P
R
O
C
E
S
S

Baseline

COMPOSITION



Degraded



Novel

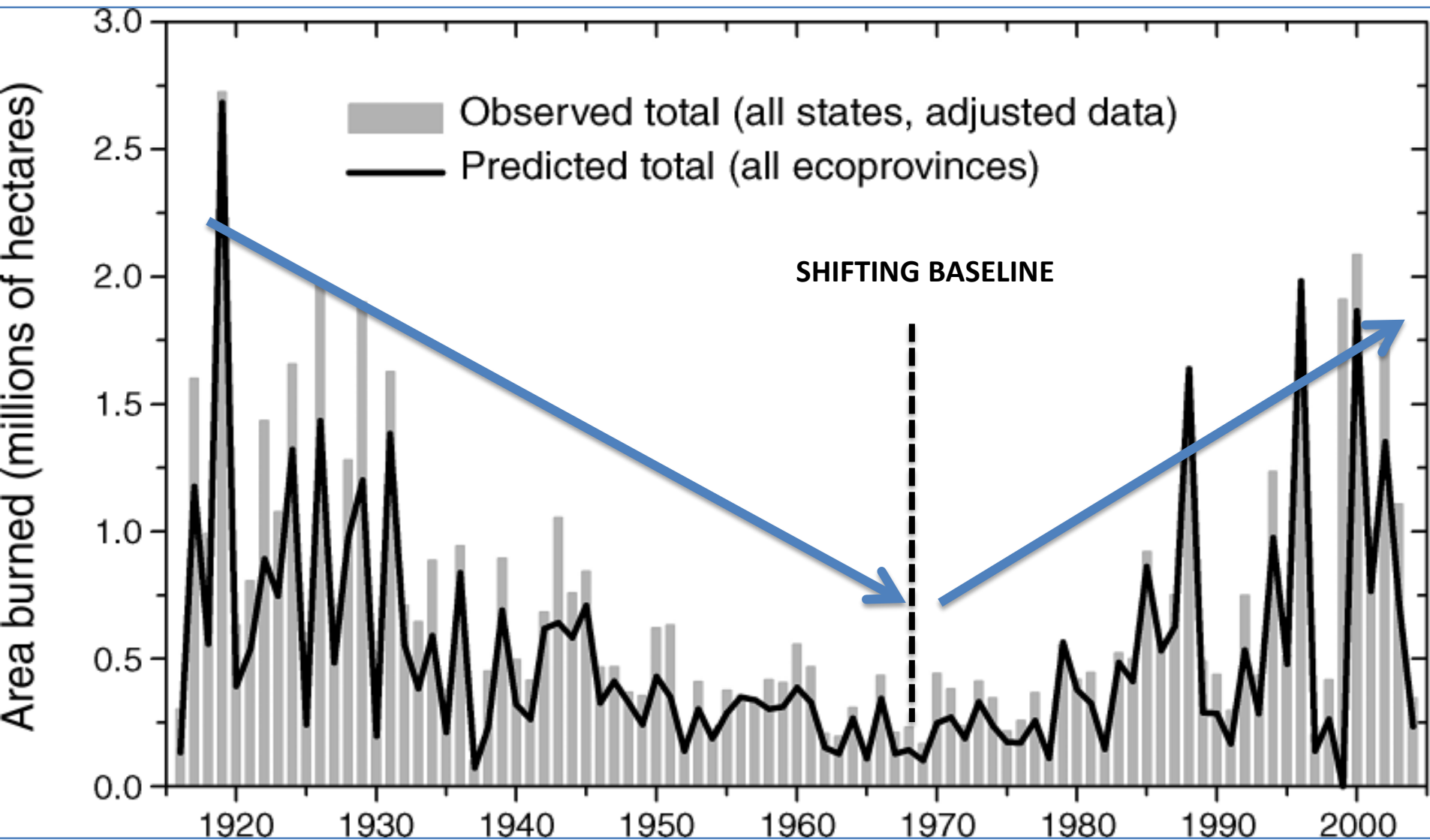
STRUCTURE

RESTORATION PRINCIPLE 5: USE A MULTI-DIMENSIONAL SITE-LEVEL BASELINE

- Restore to what?
- Reference or historic condition?
- Single species vs. ecosystem?

Source: DellaSala et al. (2013)

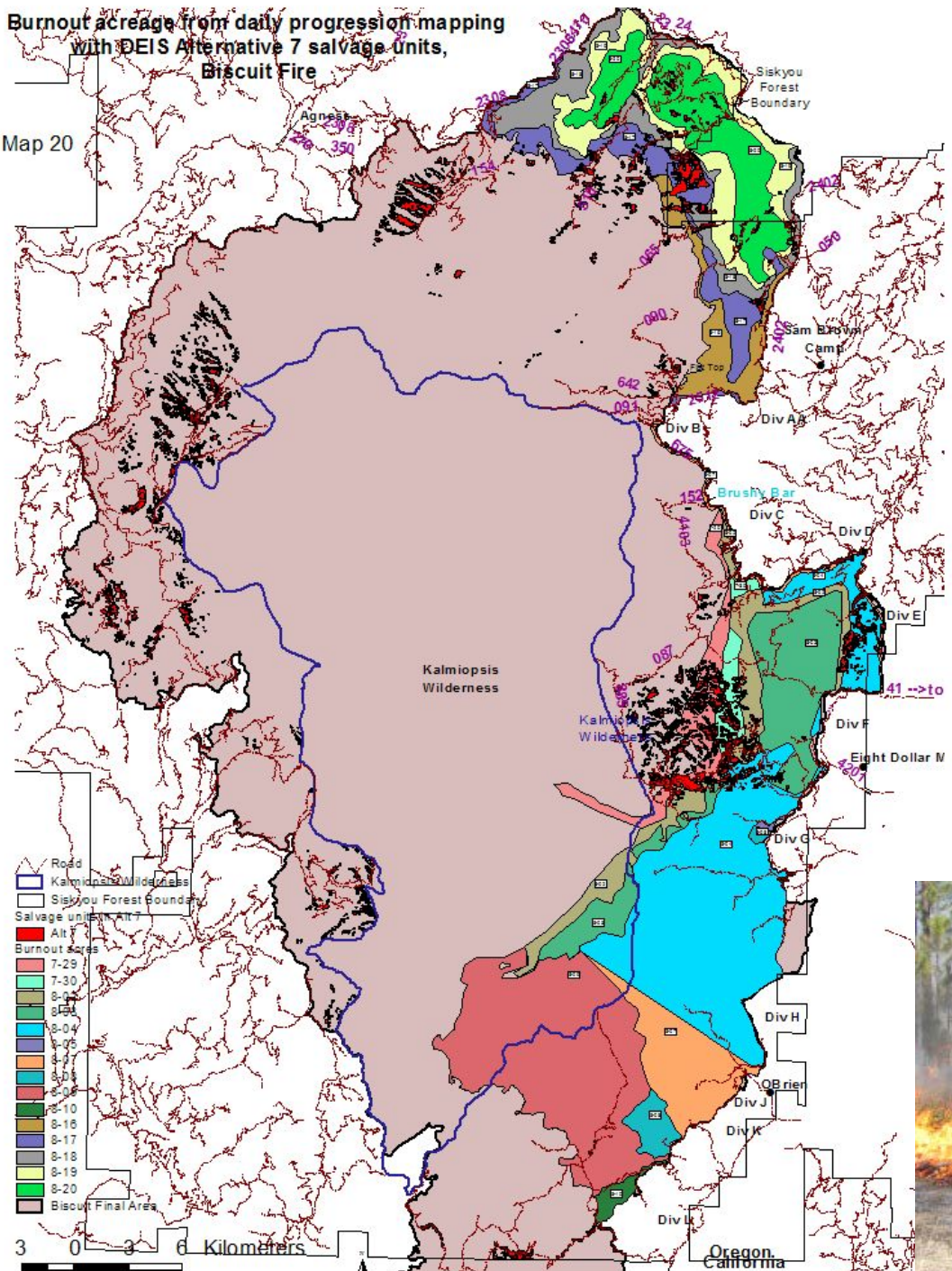
RESTORATION PRINCIPLE 6: AVOID SHIFTING BASELINES



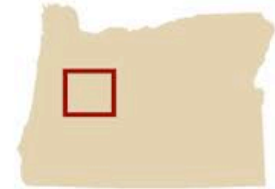
Source: Littell (2009)

BACK-BURN INFLUENCE TYPICALLY NEGLECTED

- ~1/3 of eastern perimeter back-burned
- Not addressed in fire studies
- How can we tell if fire is out of bounds if back-burn influences are this prominent?

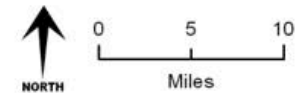


RESTORATION PRINCIPLE 7: RIP THE ROADS (AQUATICS)



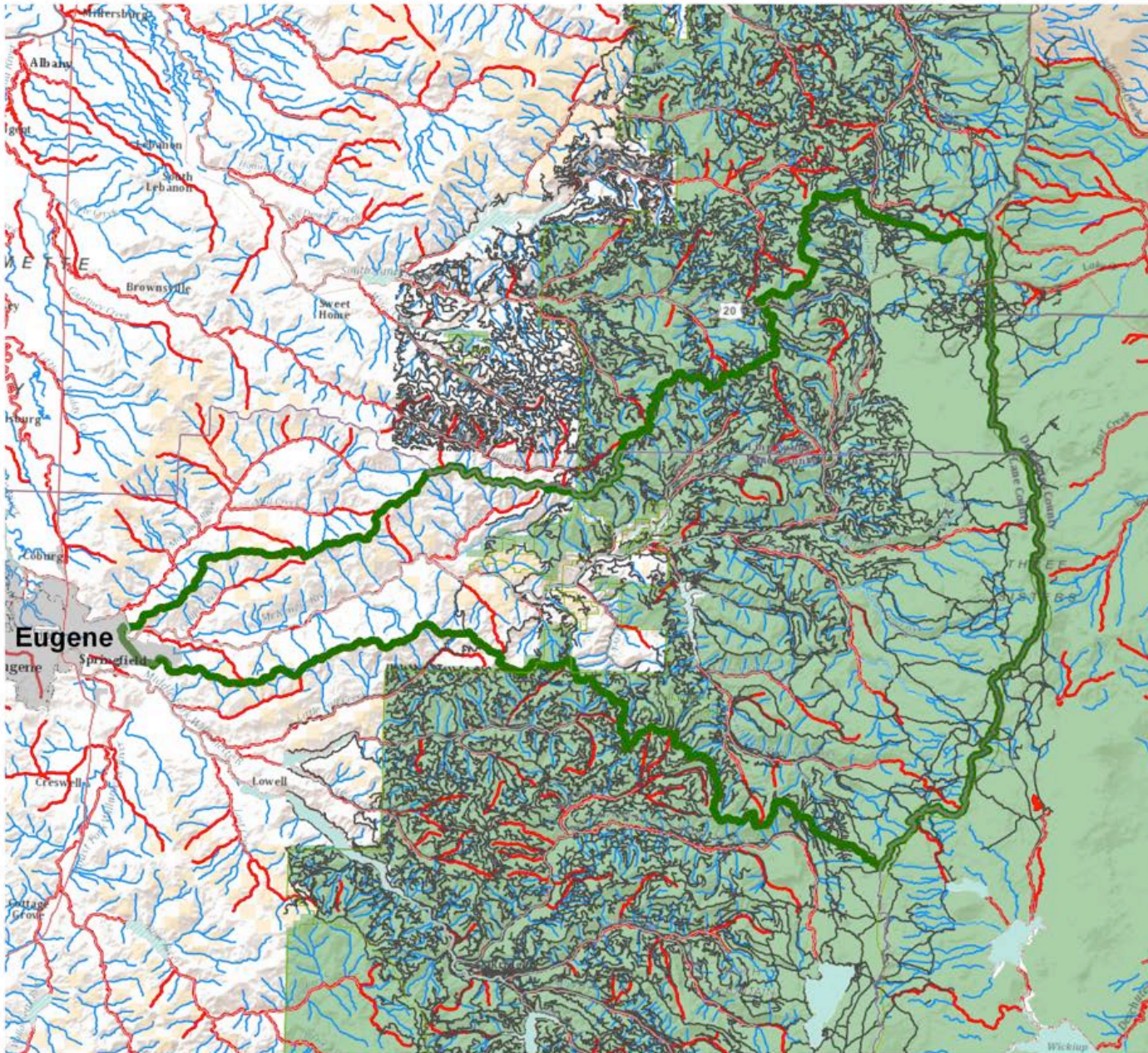
Surface Water Source Area

- Water Quality Limited
- Rivers
- USFS Roads
- Water Source Area
- Forest Service
- BLM
- Bureau of Indian Affairs



Data Sources:
Surface Water Source Areas and Water Quality Limited data from the Oregon Spatial Data Library. USFS Roads Layers compiled by Wildlands CPR. Federal Lands layer from ArcGIS.com

Projection:
Oregon Statewide Lambert NAD 1983

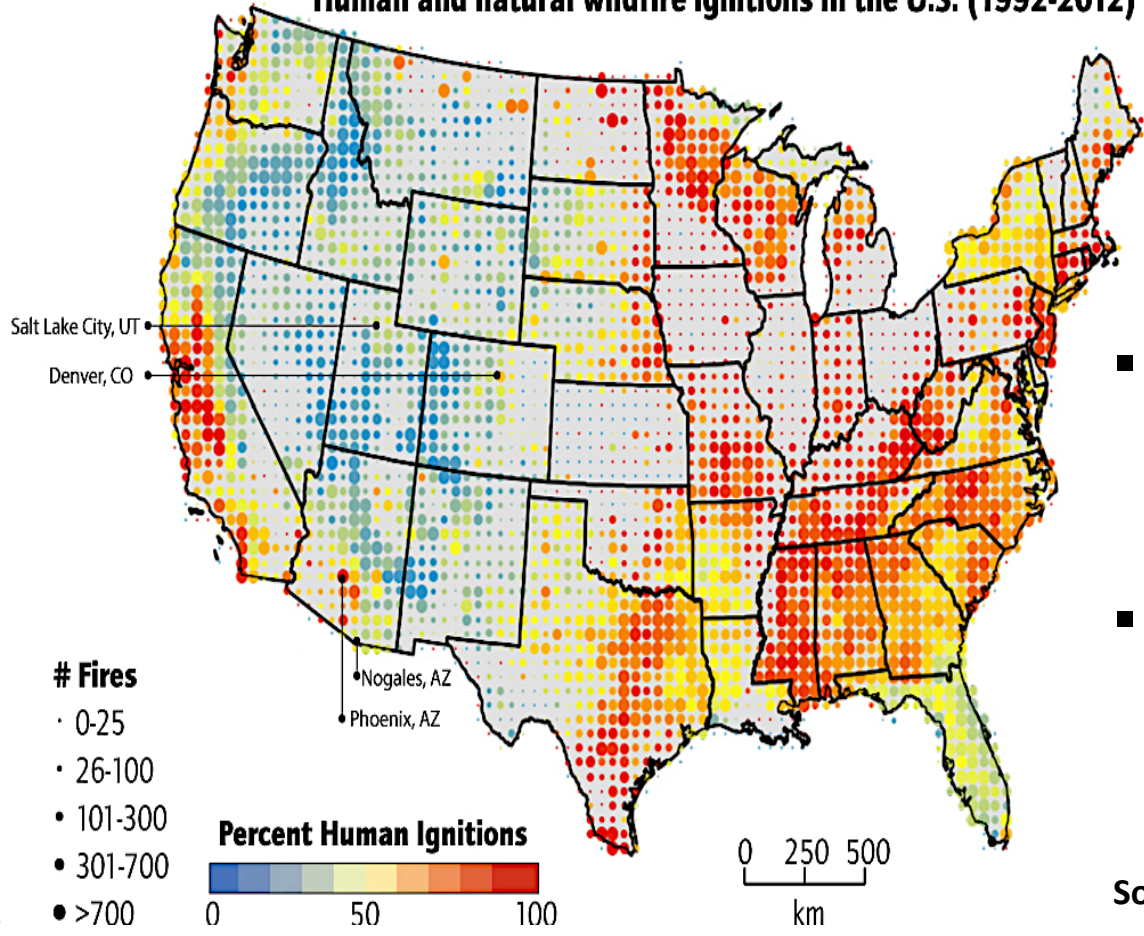


Human and natural wildfire ignitions in the U.S. (1992-2012)

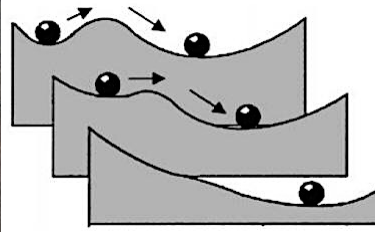
PRINCIPLE 8: REDUCE HUMAN-CAUSED IGNITIONS (ROADS)

- 1.5 million human caused fires 1992-2012; 84% of wildfires
- Humans are contributing to longer wildfire seasons in West

Source: Balch et al. (2017)



RESTORATION PRINCIPLE 9: MANAGE PULSE DISTURBANCES, REDUCE CHRONIC DISTURBANCES



Chronic Disturbances (land-uses)

Type conversion to flammable plantations
Extensive roads (water quality problems)
Noxious weed pathways (synergistic)
Impacts to T & E species
Stressors accumulate (low resistance/resilience)

Pulse Disturbances (wildland fire)

Diverse, complex early seral forests (snags)
Short lived sediment impact then positive
Roadless areas resistance to noxious weeds
T&E species ok (beneficial to some)
High resistance and resilience

RESTORATION PRINCIPLE 10: GET TO COEXISTENCE, MORE FIRE COMING?

✓ **WORK WITH FIRE, NOT AGAINST**



✓ **HOMELAND FIRE SECURITY**



✓ **THIN FLAMMABLE PLANTATIONS
(limitations)**

✓ **PRESCRIBED FIRE – LOW ELEVATIONS-
LOW SEVERITY (oak woodland, savanna)**



THE ECOLOGICAL IMPORTANCE OF MIXED-SEVERITY FIRES NATURE'S PHOENIX

Dominick A. DellaSala

Chad T. Hanson



WE NEED A NEW FIRE LEXICON: PYROPHILIA?

- Nature's Phoenix trumps Smokey
- Avoid good vs. bad fire – fire is self willed force
- Purge catastrophe speak – report acres restored by fire
- A forest is more than conifers – sum of the alpha diversity parts
- Coexistence – work with fire in all its forms, prepare communities
- Post-fire logging is not “restoration”
- Ecologists from Mars, Fire Managers from Venus – can we just get along?