Addressing the Illusion of Preservation in Riparian Forests

Rob York and Ariel Roughton

What is a Riparian Forest?

- What the public tends to think about:

What is a Riparian Forest?

- What we (RPF's) tend to think about:

Procedures for Determining Watercourse and Lake Protection Zone Widths and Protective Measures[1]

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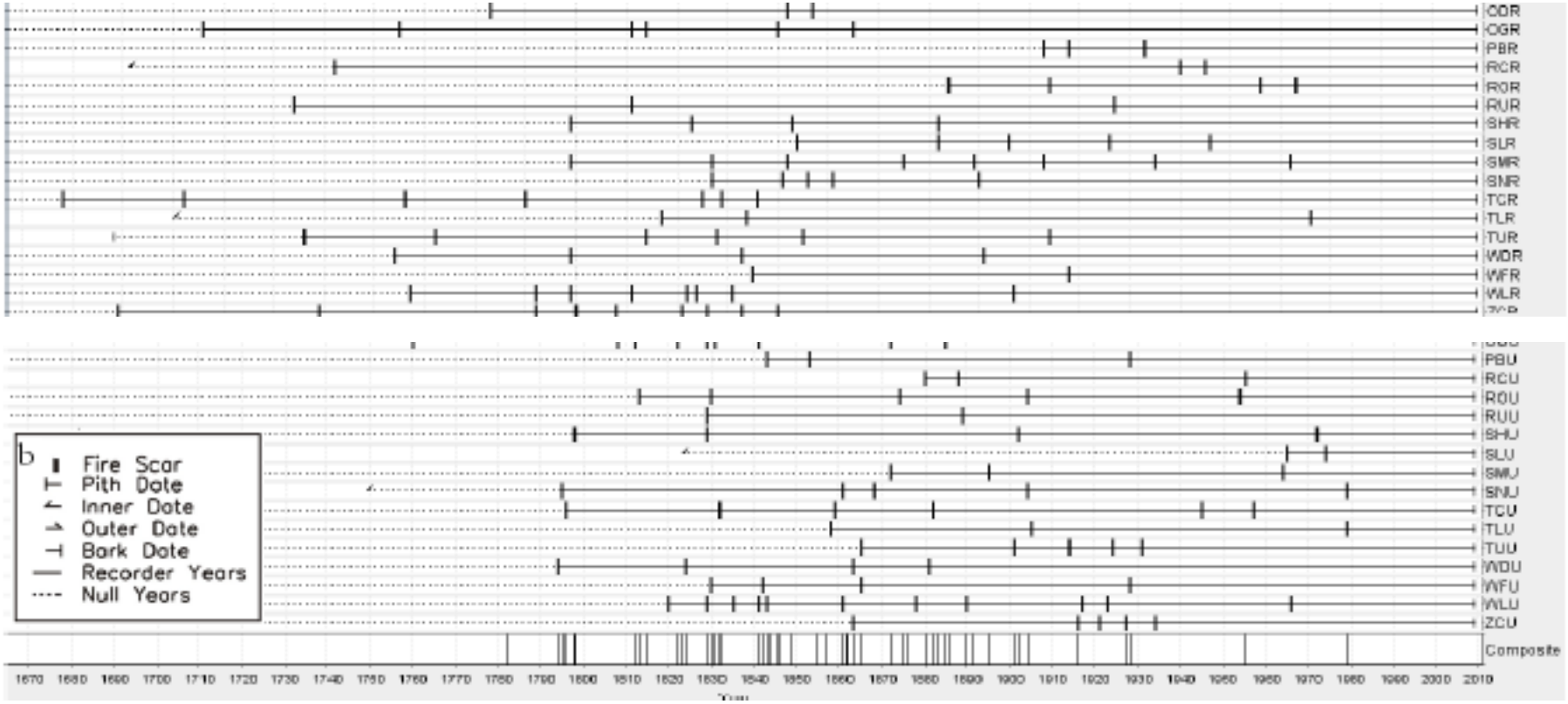
Paradox of protection in Sierra Nevada Forests

Can’t protect forests from both fire and foresters

Fire history in Riparian areas

Good body of support for frequent fire in riparian areas: Agee 1998; Dwier and Kaufmann 2003; Everett et al. 2003; Pettit and Naiman 2007; Skinner 2003; **Van de Water 2011**



- Riparian FRI = 16.6 yrs; Upslope = 16.9yrs
- Seasonality also similar- both occurred in late summer-early fall dormant season

Riparian v. upland area management: An example

Predicted fire behavior

Up-slope of WLPZ

WLPZ

P-Torch = 0.16
Surface fuel = 13 tons/acre

P-Torch = 0.76
Surface fuel = 45 tons/acre

Why consider treatments in WLPZ's?

1. DREGS – Disturbance REgime Guided Silviculture

Can't practice DREGS with current REGS

Why consider treatments in WLPZs?

2. Objective-based silviculture

    - Reduce high severity fire

3. Restoration of structure

Year	Total basal area ($ft^2\ ac^{-1}$)	Number of trees > 6" (ac^{-1})	Shrubs (% cover)
1911	70	19	65
2013	248	225	30

Collins et al. 2011

4. Restoration of composition

Bio-Indicators of *localized* high severity disturbance:

- Ponderosa pine
- Alder

Alder- a closer look

Science
AAAS

Widespread Increase of Tree Mortality Rates in the Western United States

Phillip J. van Mantgem, *et al.*

Science **323**, 521 (2009);
DOI: 10.1126/science.1165000

Mortality rates of conifers increased from 0.5 to ~1.5% per year

Alder at Blodgett:

- Mortality = 2.8% per year
- Recruitment = 0% per year

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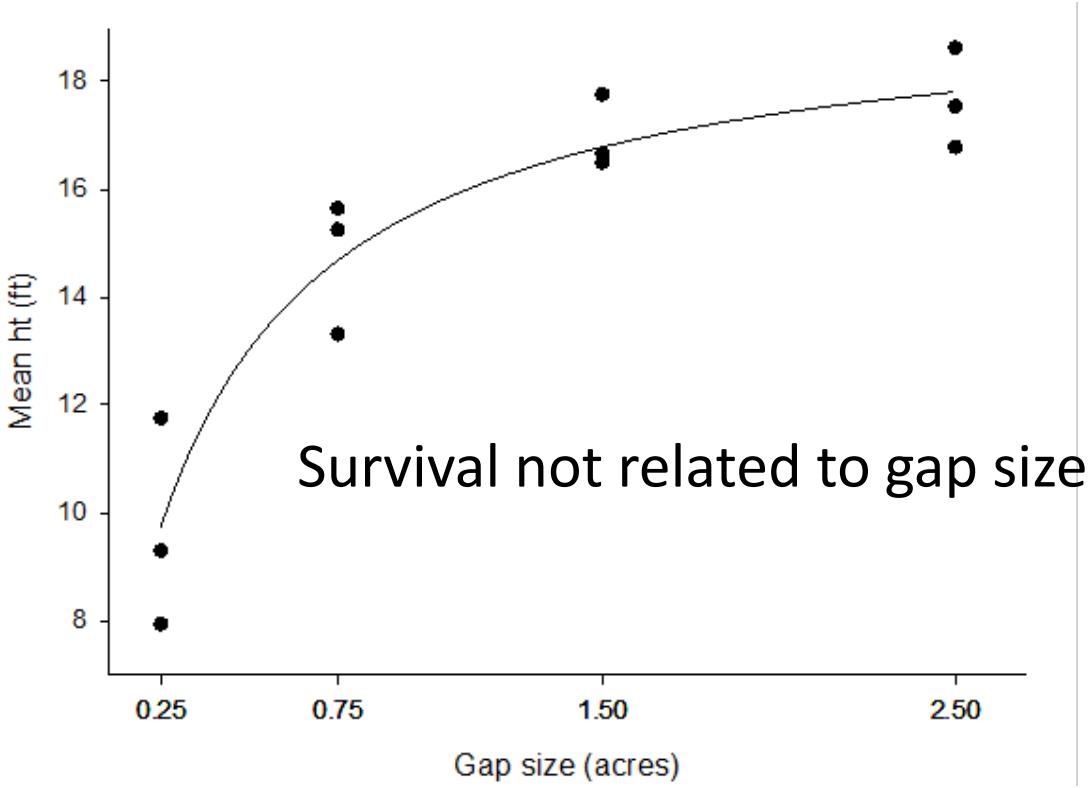
5. To regenerate forests

- Heterogeneity w/ gap-based silviculture

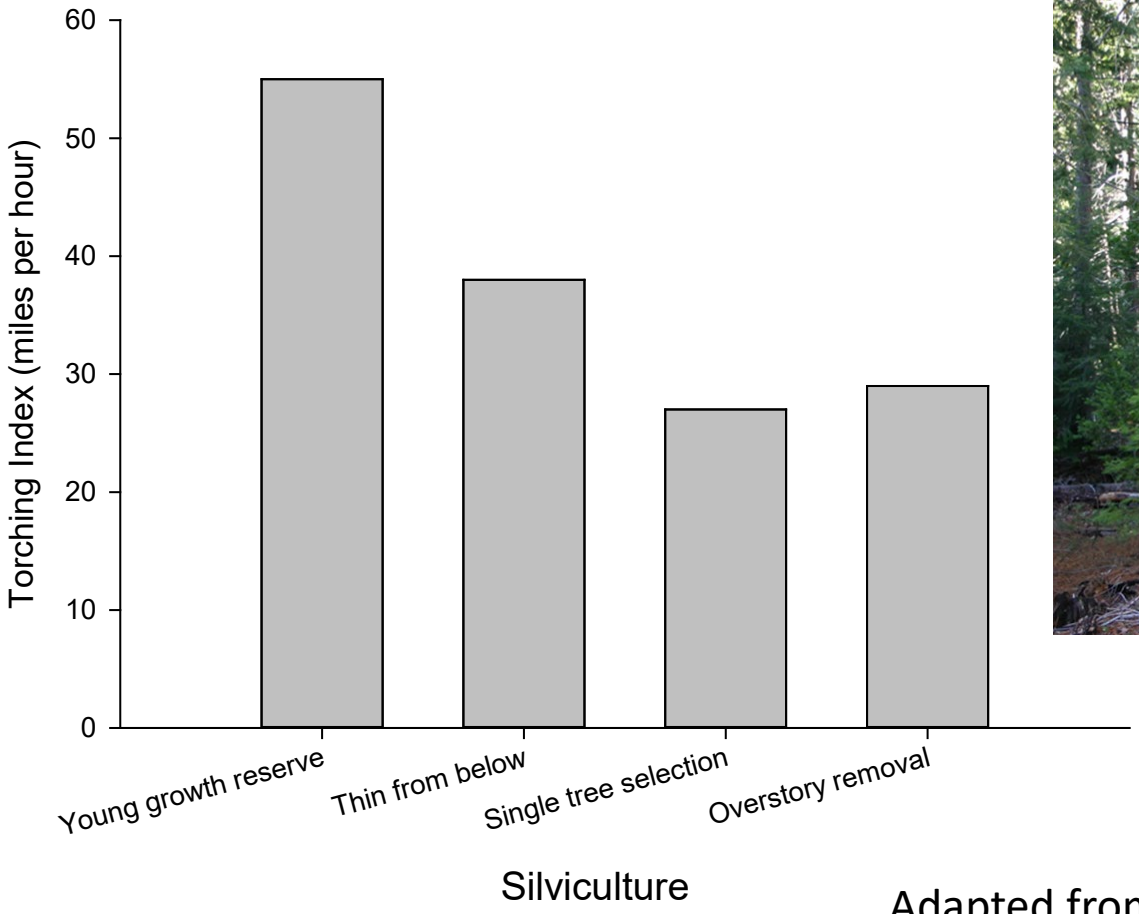


Survival not related to gap size

York et al. 2006

6. To have an alternative to the status quo

Selective harvesting without fuel reduction



Adapted from Stephens and Mogghadas 2005

7. The Forest Service is doing it…

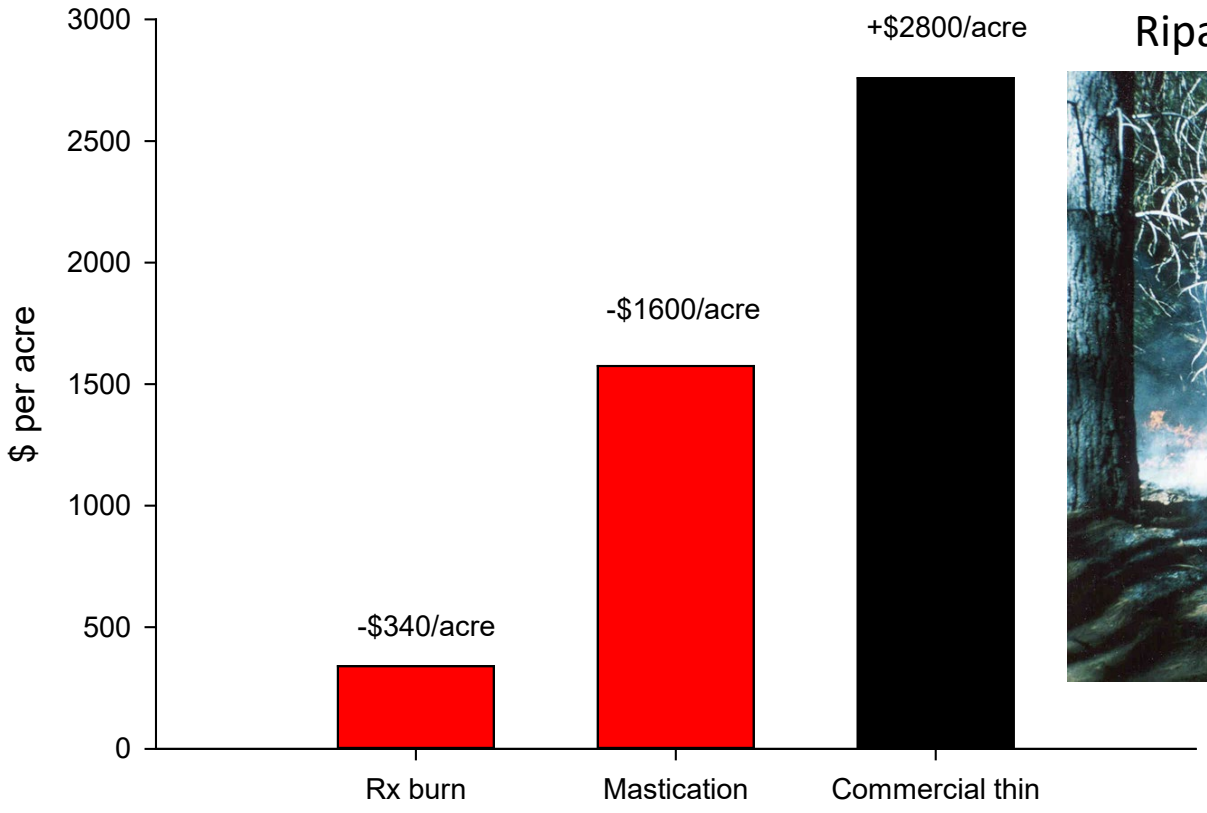
- Maybe? (no monitoring)
- Most common objective: Fuel reduction
- Tx's: Rx fire and mechanical thinning

Fig. 1 Geographic distribution of US Forest Service Districts surveyed with (*filled circle*, 32 Districts) and without (*open circle*, 42 Districts) riparian fuel treatments

Stone et al. 2010

Why not just do fuel treatments not associated with Timber Operations?

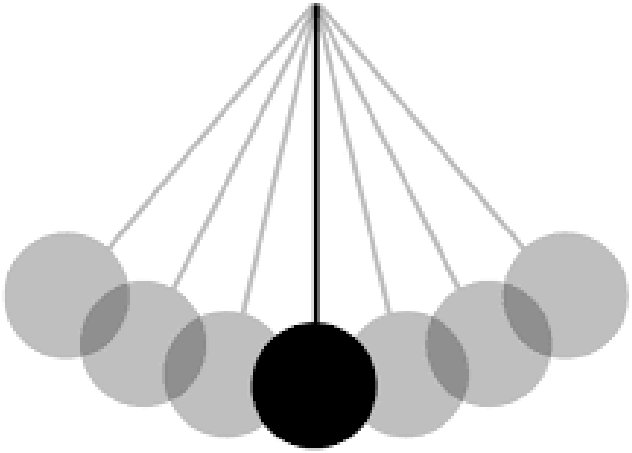
Too expensive to be sustainable



Adapted from Hartsough et al. 2008

Riparian Rx burn

Why *not* consider treatments?



Why *not* consider treatments?

- Soil compaction from heavy equipment

Why *not* consider treatments?

- Sediment delivery

Overland runoff from disturbed areas often contain excessive sediment in addition to water. (USGS)

Why *not* consider treatments?

- Riparian exotic invasives
- Fire-sensitive riparian species

Research

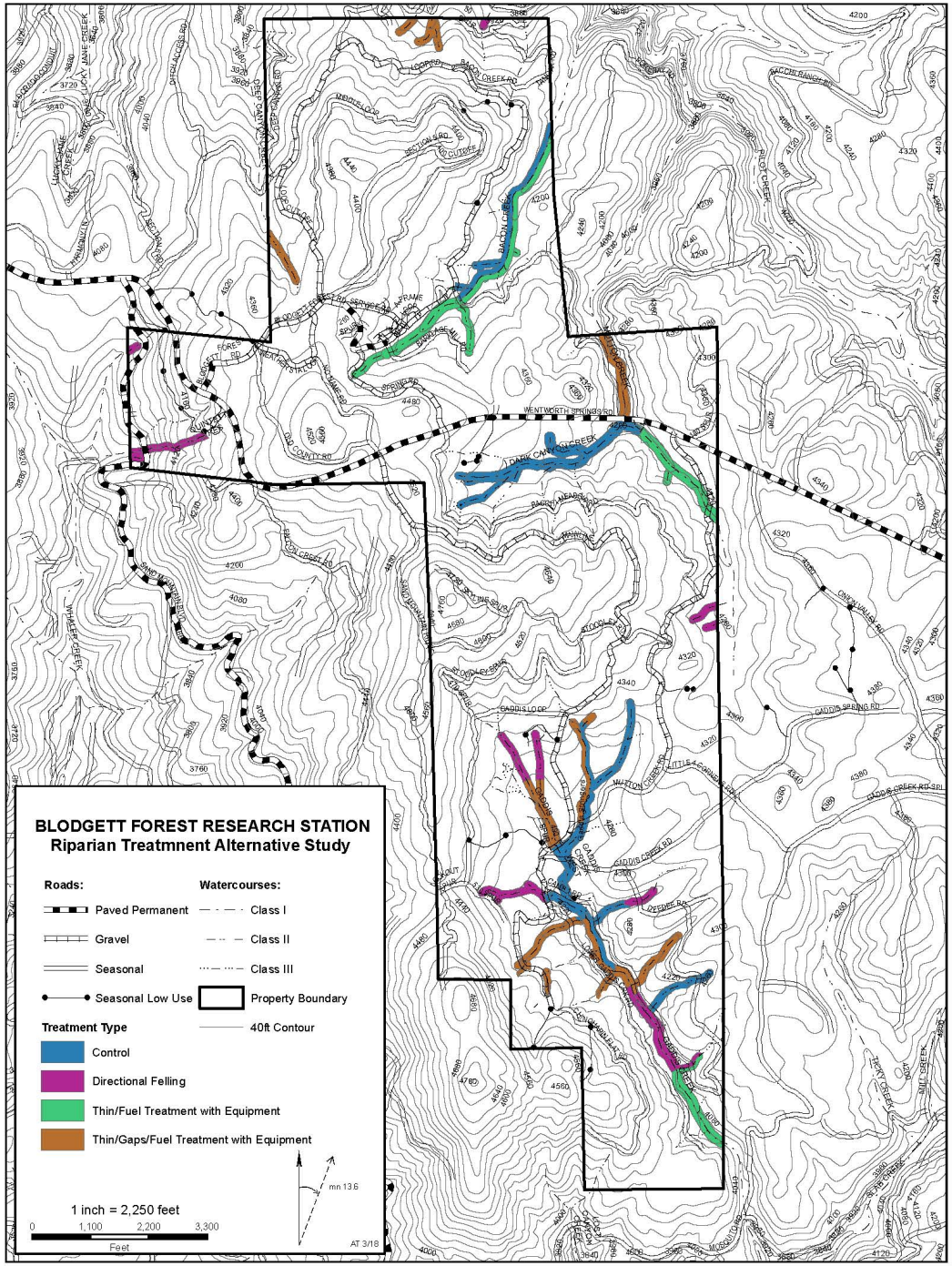
Objective:

- Trial of treatments known to be effective up-slope
- What are the tradeoffs?

Do this over here

Study area:

- Pilot phase: Blodgett Forest Research Station
- All Class I and II WLPZ's
- 7% of total area
- Random allocation to one of four treatments
- WLPZ's treated at same time as upslope areas



Treatment 1 – Do nothing

How might it be “best?”

- Protection of large trees
- Reduction of fire severity around streams may avoid high severity effects

Treatment 2 – The status quo

Selective harvest, using current WLPZ standards

- No heavy equipment
- “Get value” from the stand
- Comply with “The table”

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Tx's 3 and 4: Sing like nobody's listening and Reduce fire hazard like nobody's watching

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Basic principles of forest fuel reduction treatments

James K. Agee [a,*], Carl N. Skinner [b]

[a] College of Forest Resources, Box 352100, University of Washington, Seattle, WA 98195, USA

[b] USDA ... Service, Pacific Southwest Research Station, 3644 Avtech Parkway, Red... 96002, USA

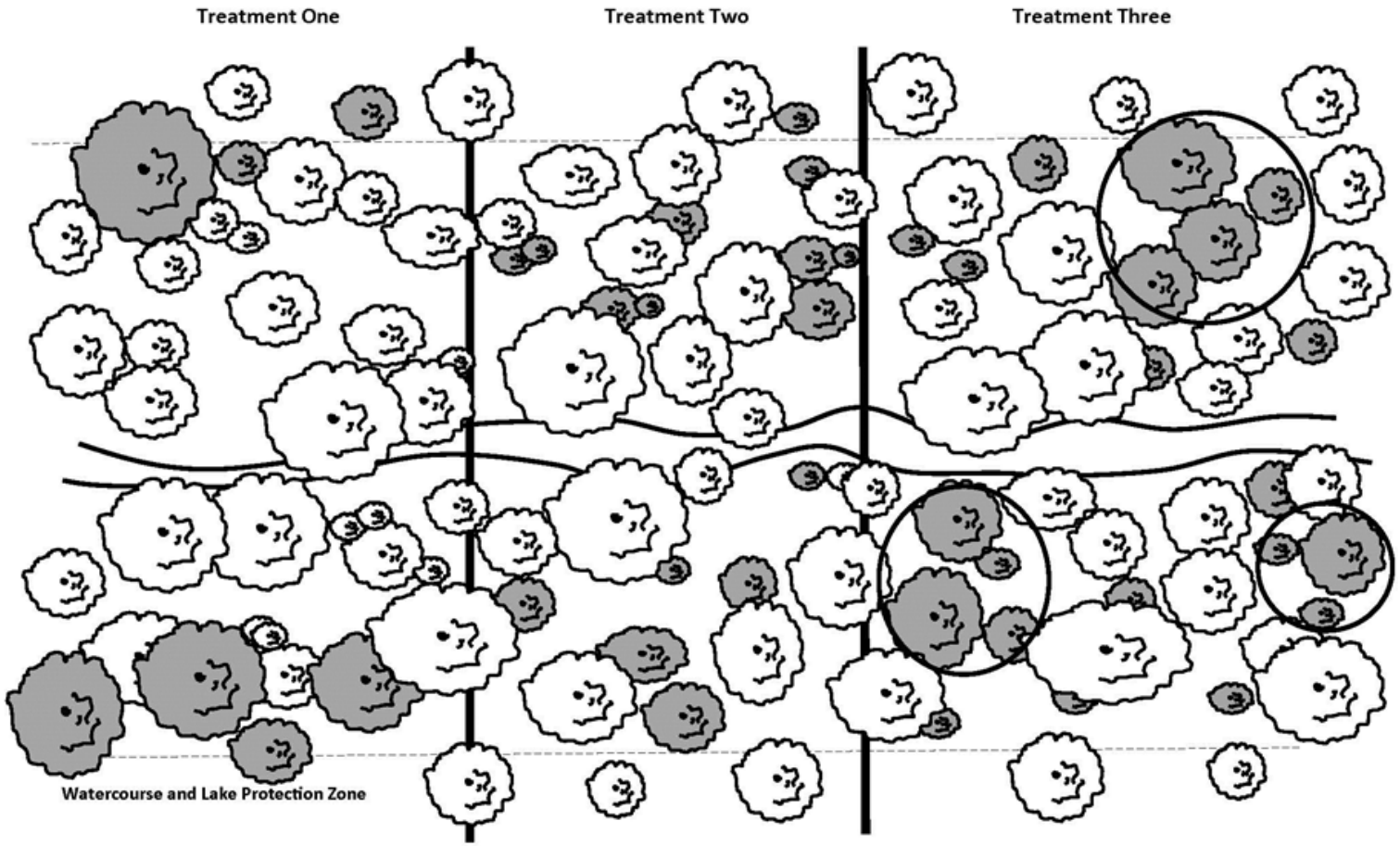
Treatment 3 – *Legit* fuel treatment

- Heavy equipment allowed during timber operations
- Thin from below to 150ft2/acre
- Improve spacing, vigor, tree size
- Follow-up with a ladder and surface fuel treatment:
  - Pile and burn or broadcast burn

Treatment 4 – *Legit* fuel treatment and gap creation

- Same as treatment 3 plus
- Gap-based silviculture
  - Gaps range from 0.1 to 0.4 acres
  - Post-harvest slash piling with excavator
  - Plant PP and SP

Status quo v. legit fuel treatments



Post Timber Operations Fuel Reduction

"Pile-casting" hand piles
Fall 2018

Burning machine piles in gap
Fall 2018

Study timeline

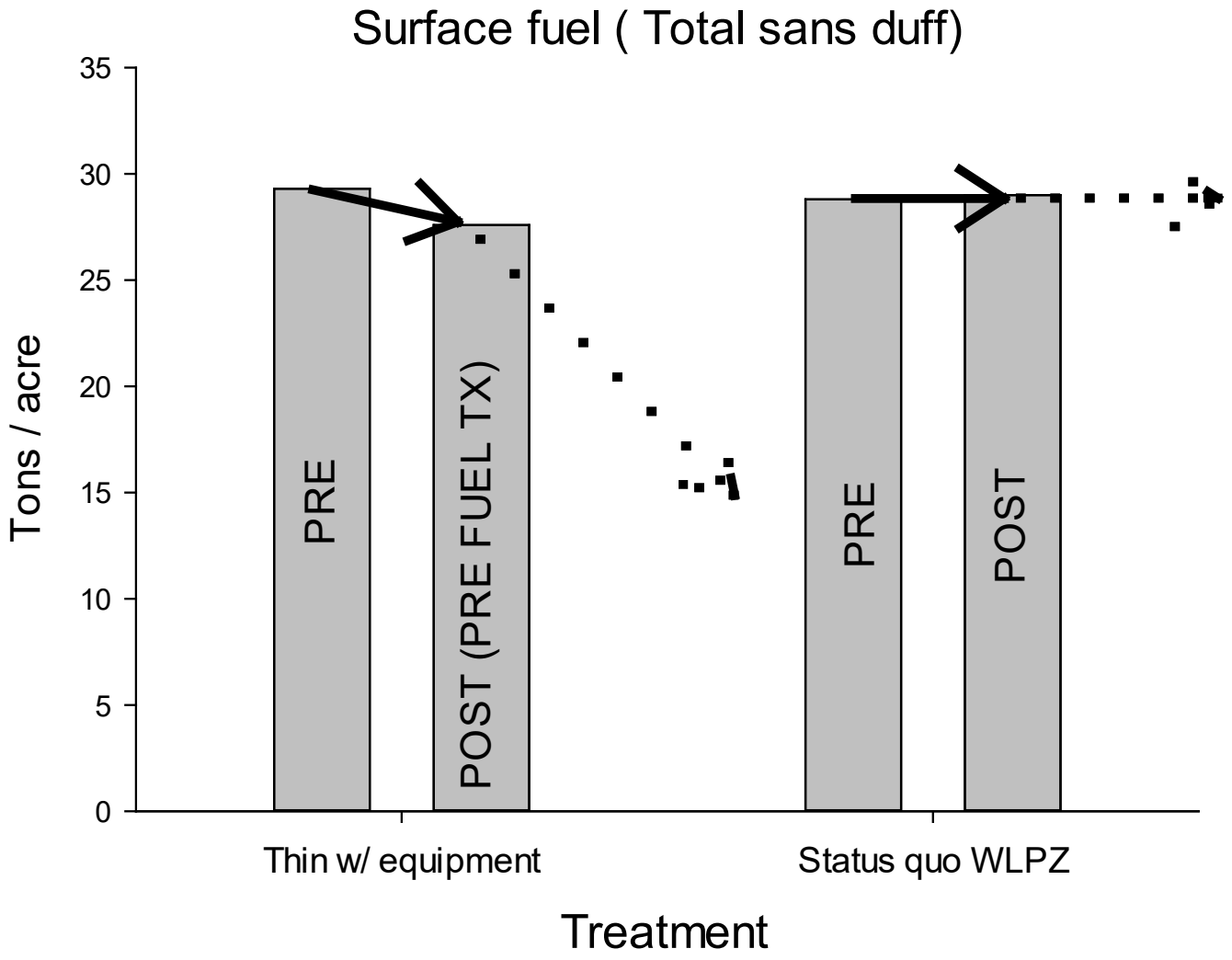
Phase 1

- Pre-treatment measure in 1997, ~2007, 2016
- Commercial thins (2018-)
- Post commercial thin measure
- Fuel treatment
- Post fuel treatment measure

Phase 2

- ~5-yr post treatment measure
- Expand treatments and monitoring to other locations

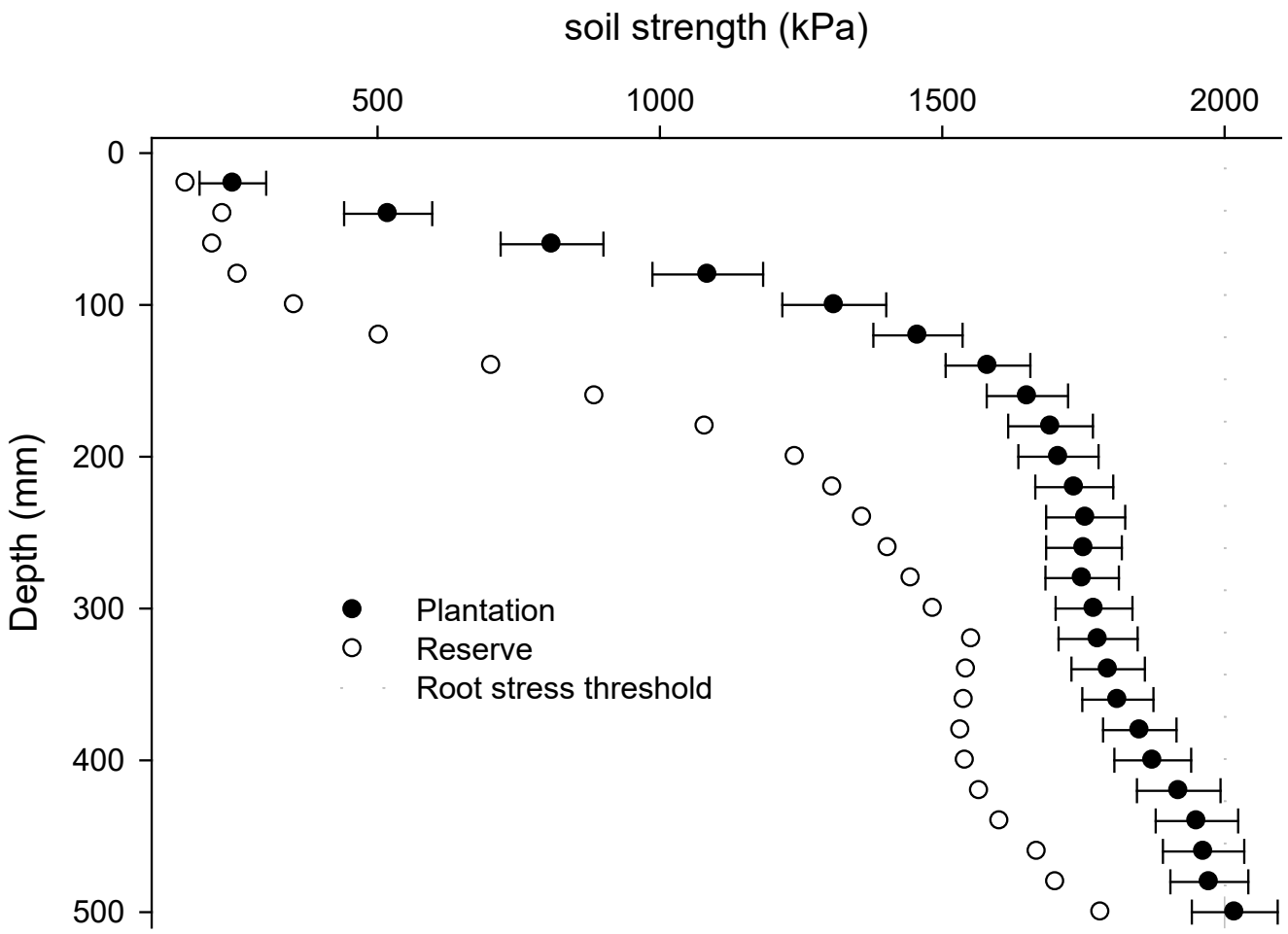
Preliminary Results



Treatment effects on yield

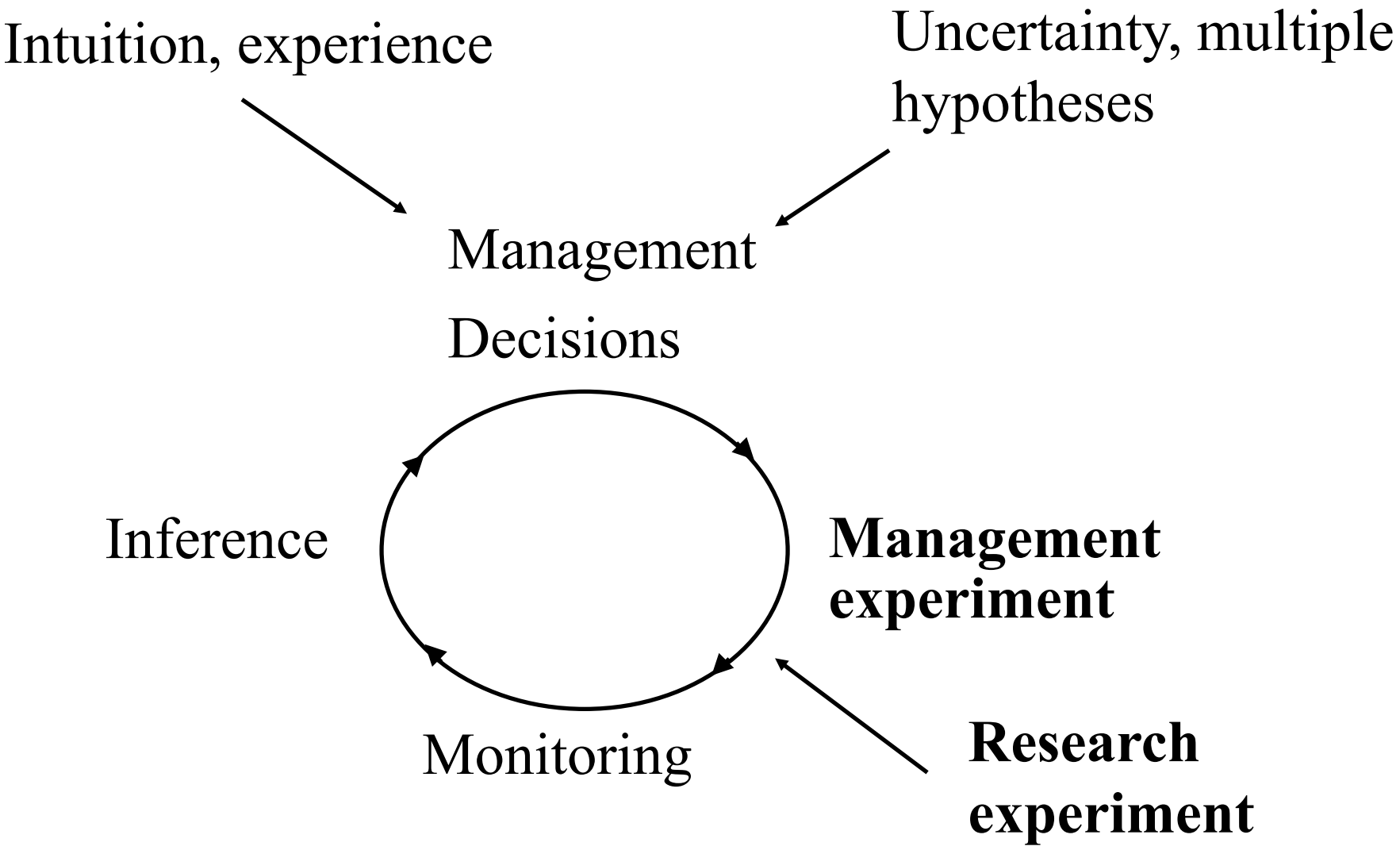
Treatment	Mean dbh cut	MBF/acre	% increase in yield	$/acre
Status quo	19”	8.5	--	$2,286
Thin from below	17”	14	63	$3,739
Thin + gap creation	18”	22	167	$5,992

Soil compaction… expectations



York et al. 2015

Active Adaptive Management



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High severity effects in riparian areas

- Should not be surprising given:
  - Disturbance departures are very high, and get higher every year
  - Homogenization in structure + fuel load = high severity fire