Timber Hauliers Conference

Scotland 03 / 2010

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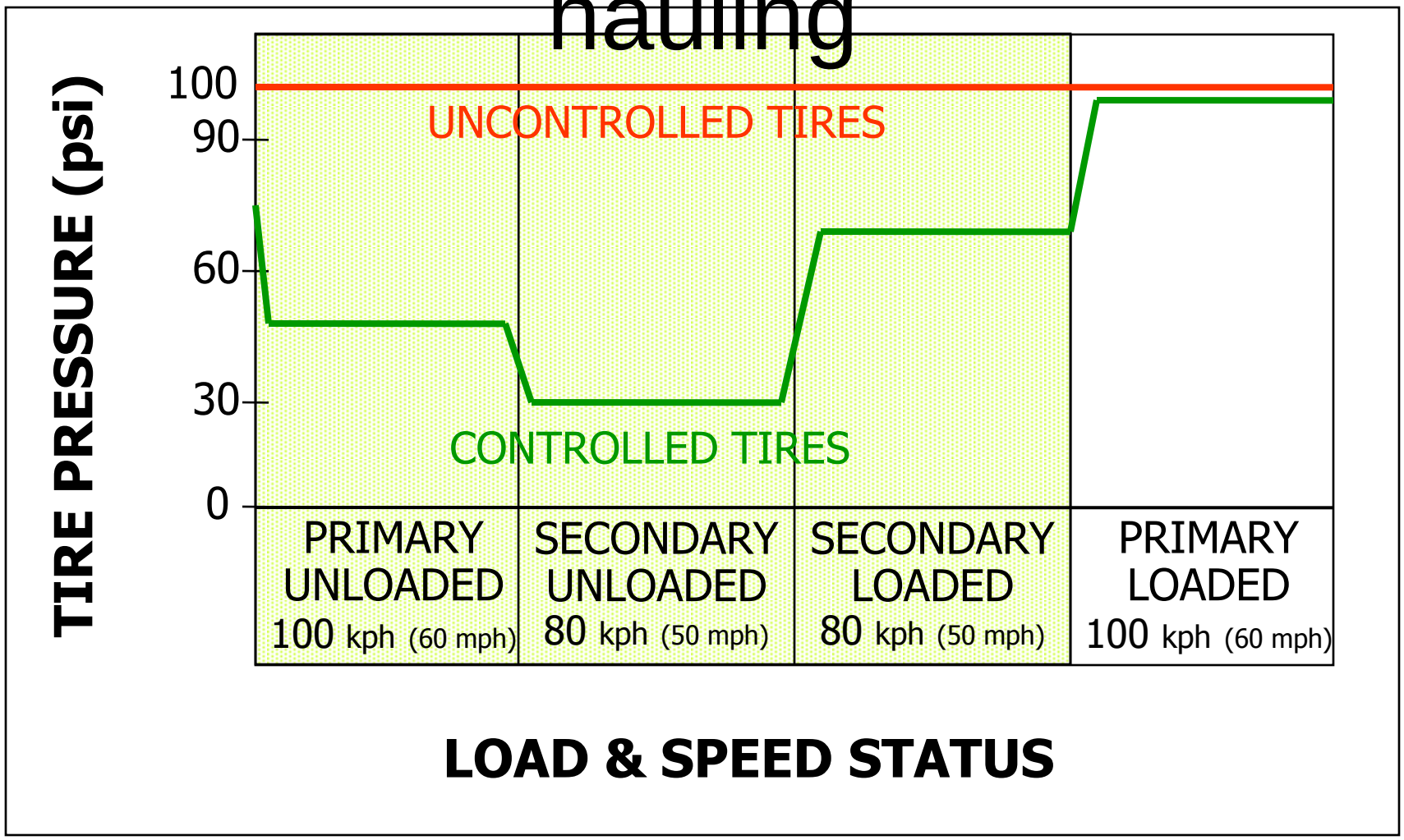
Tyre Development

- 1846 – Robert William Thomson invented and patented the pneumatic tire
- 1888 – First commercial pneumatic bicycle tire produced by Dunlop
- 1889 – John Boyd Dunlop patented the pneumatic tire in the UK
- 1890 – Dunlop, and William Harvey Du Cros began production of pneumatic tires in Ireland
- 1890 – Bartlett Clincher rim introduced
- 1891 – Dunlop's patent invalidated in favor of Thomson's patent
- 1892 – Beaded edge tires introduced in the U.S.
- 1894 – E.J. Pennington invents the first balloon tire
- 1895 – Michelin introduced pneumatic automobile tires
- 1898 – Schrader valve stem patented
- 1900 – Cord Tires introduced by Palmer (England) and BFGoodrich (U.S.)
- 1903 – Goodyear Tire Company patented the first tubeless tire, however it was not introduced until 1954
- 1904 – Goodyear and Firestone started producing cord reinforced tires
- 1904 – Mountable rims were introduced that allowed drivers to fix their own flats
- 1908 – Frank Seiberling invented grooved tires with improved road traction
- 1910 – BFGoodrich Company invented longer life tires by adding carbon black to the rubber
- 1919 – Goodyear and Dunlop announced pneumatic truck tires**[2]**
- 1938 – Goodyear introduced the rayon cord tire
- 1940 – BFGoodrich introduced the first commercial synthetic rubber tire
- 1946 – Michelin introduced the radial tire
- 1947 – Goodyear introduced first nylon tires
- 1947 – BFGoodrich introduced the tubeless tire
- 1963 – Use of polyester cord introduced by Goodyear
- 1965 – BFGoodrich offered the first radial available in North America
- 1967 – Poly/glass tires introduced by Firestone and Goodyear
- 1968 – United States Department of Transportation (DOT) numbers required on new tires in USA
- 1974 – Pirelli introduced the wide radial tire
- 2005? - Michelin introduces the Tweel

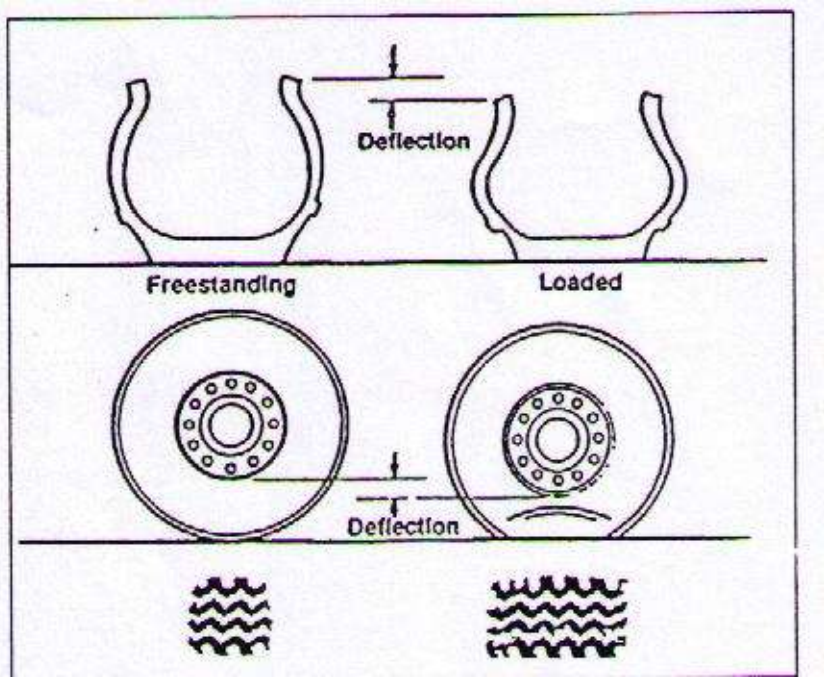
Typical resource road hauling



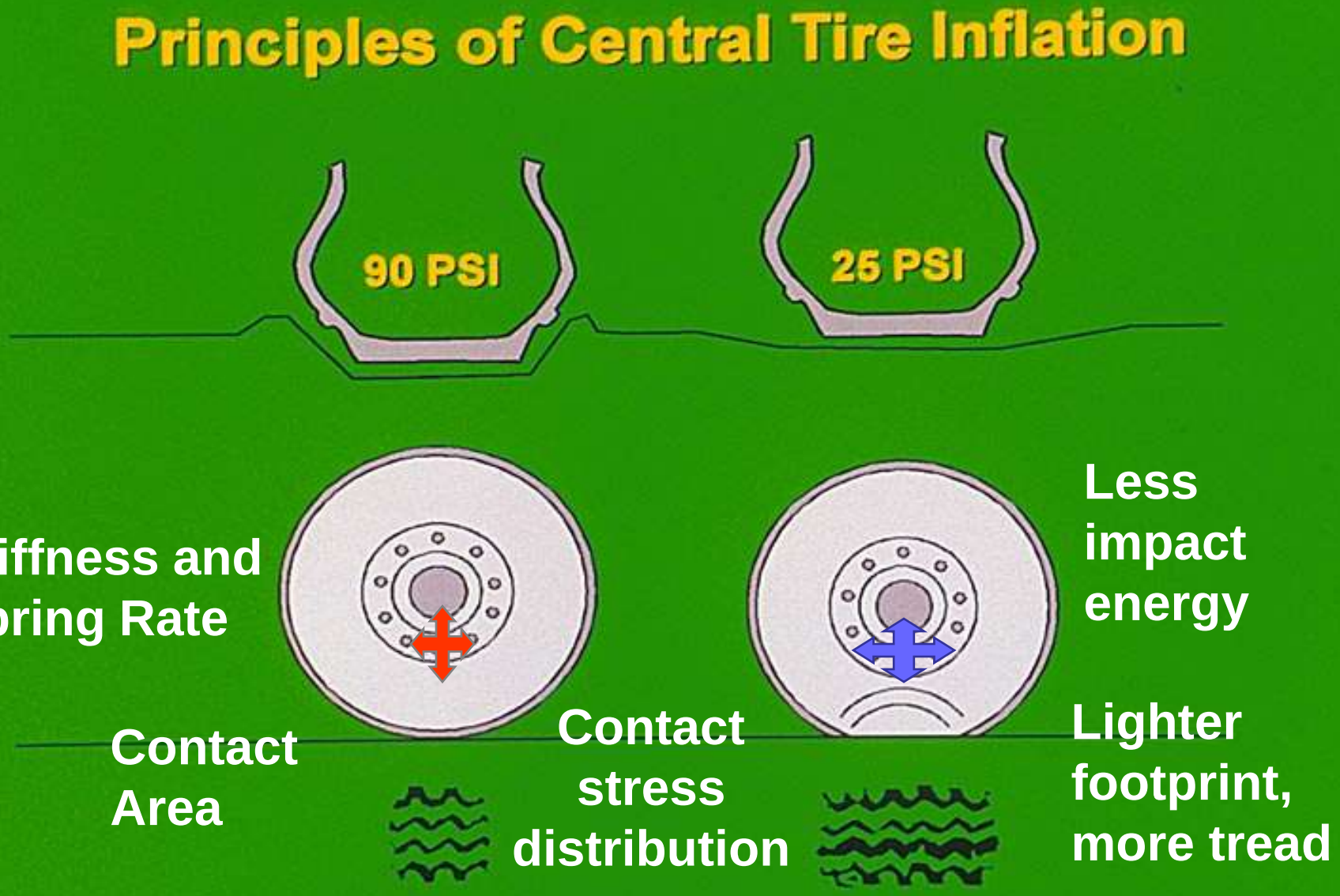
- Uncontrolled tires are over-inflated for 75% of the cycle

Manufacturers Deflection Recommendations

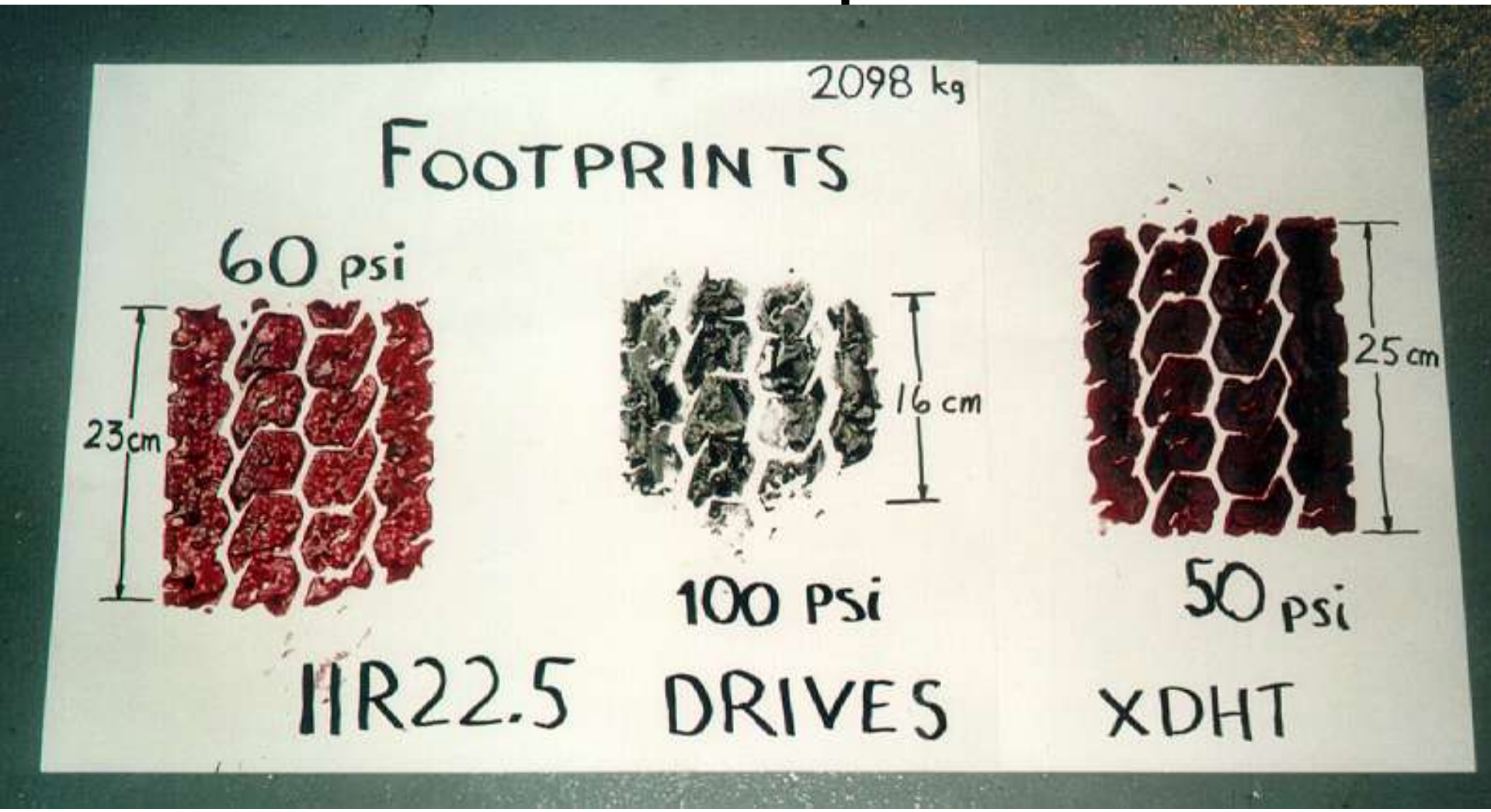
- High Speed Operations
  10 – 14% Deflection
- Low Speed Operation
  17 – 21% Deflection



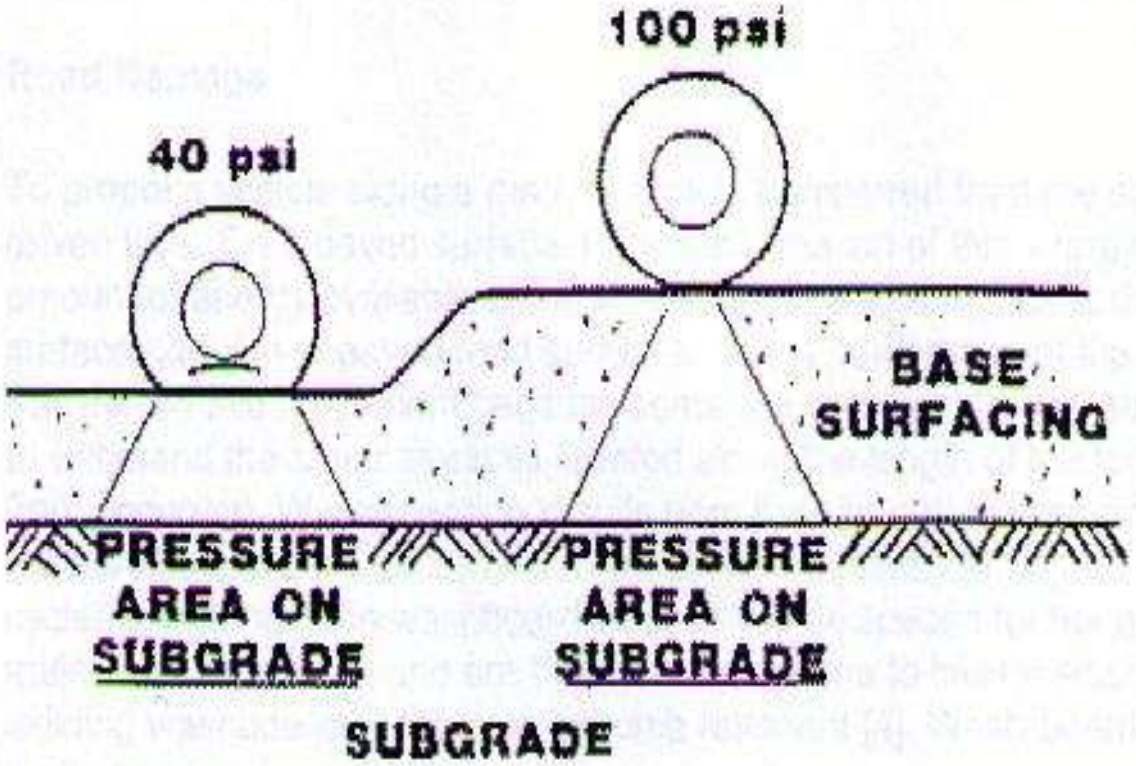
Reducing tire pressure causes fundamental changes to tire-road interaction



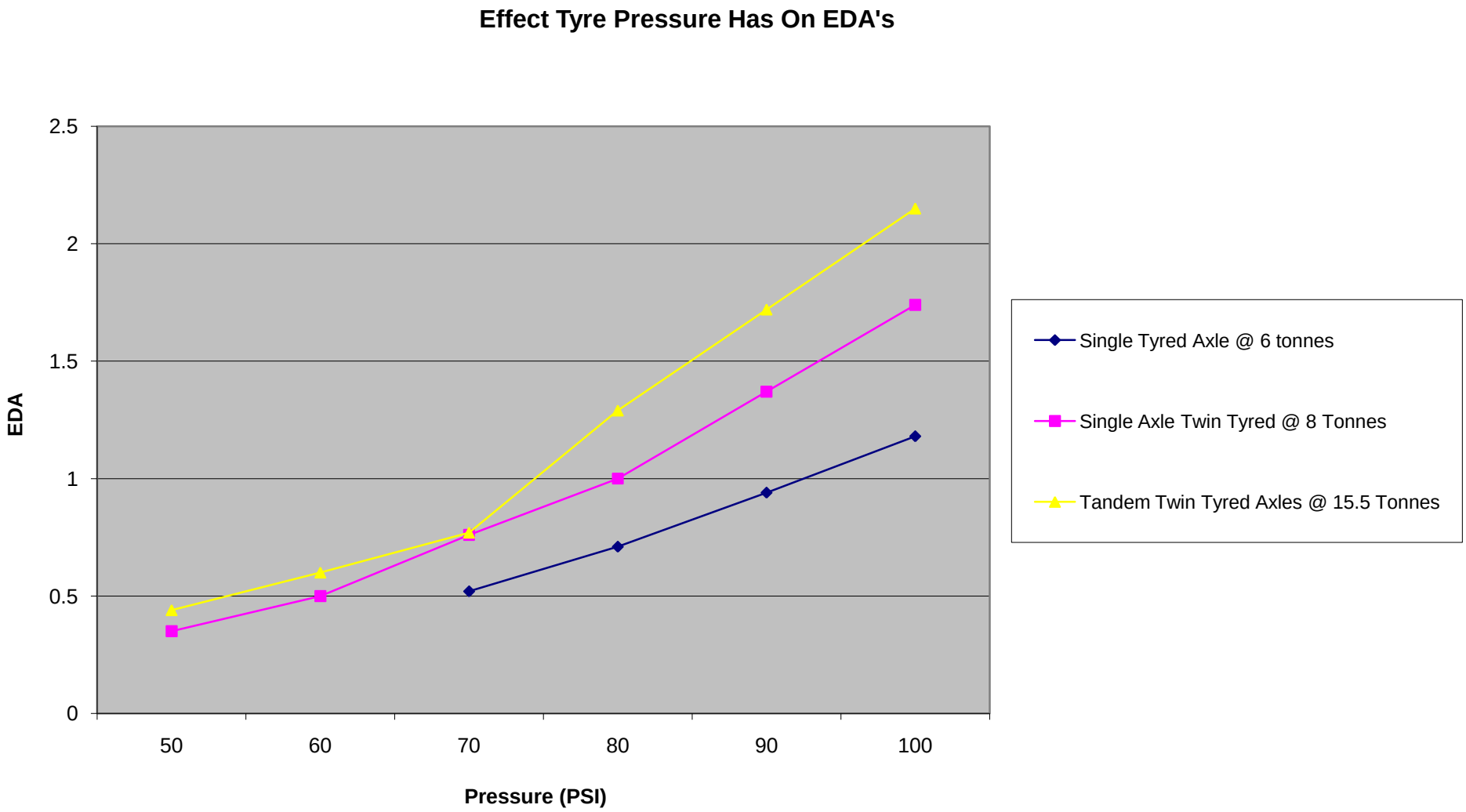
Tire inflation changes footprint size, shape, and contact pressure



Tyre Pressure and Effect on Pressure Area of Subgrade



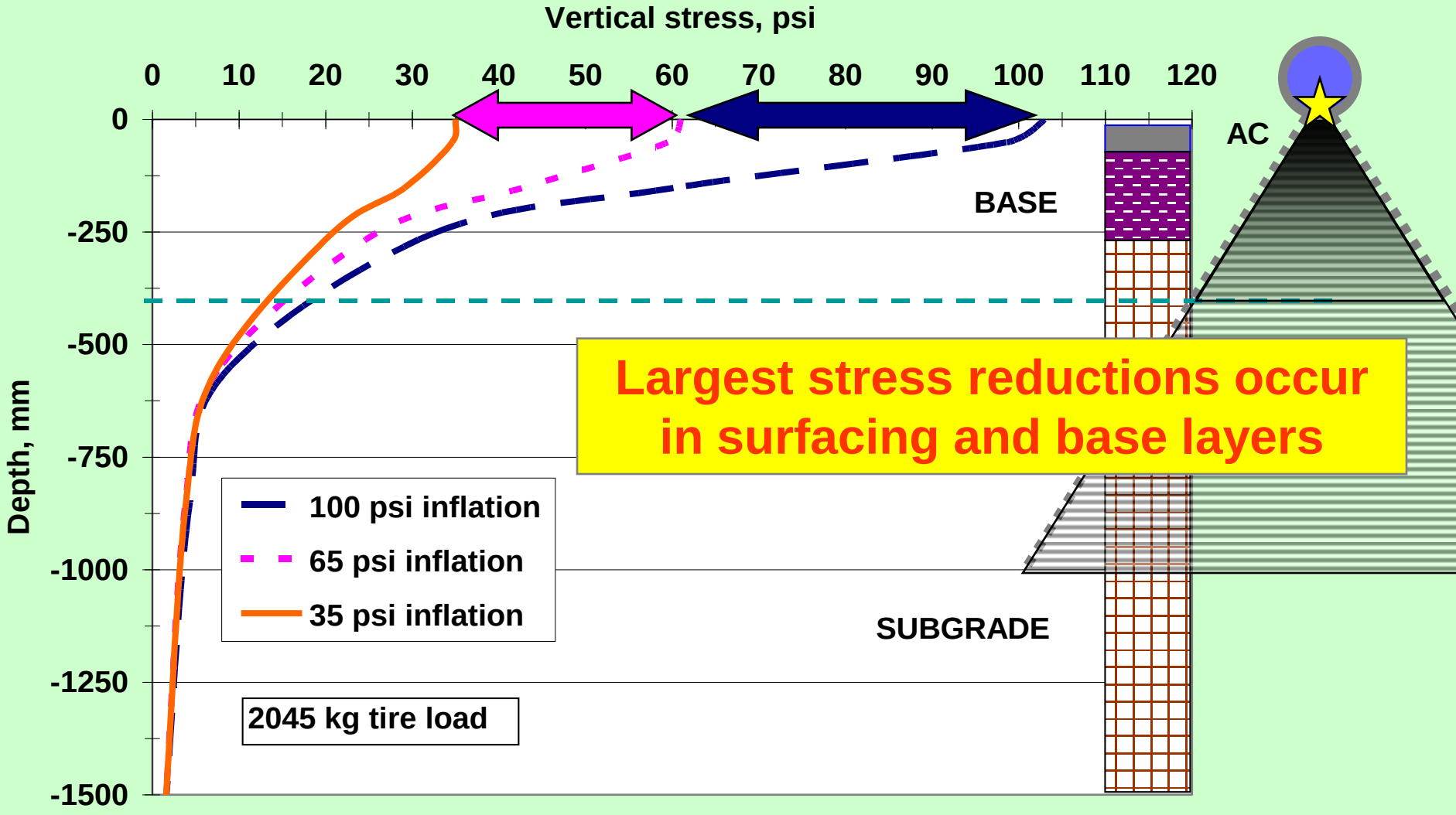
Effect Tyre Pressure Has on EDA's



Truck benefits of reduced tire pressure

- Enhanced traction and gradeability
- Improved flotation
  (fewer delays and assists)
- Improved fuel efficiency
  (less wheel slip and reduced rolling resistance)
- Reduced shock and vibration
  (improved ride and less component damage)
- Improved tire life and recap-ability
  (better puncture and cut resistance)
- Longer vehicle life

Vertical stress distribution in a low standard road



Road benefits of reduced tire pressure

- Less road damage

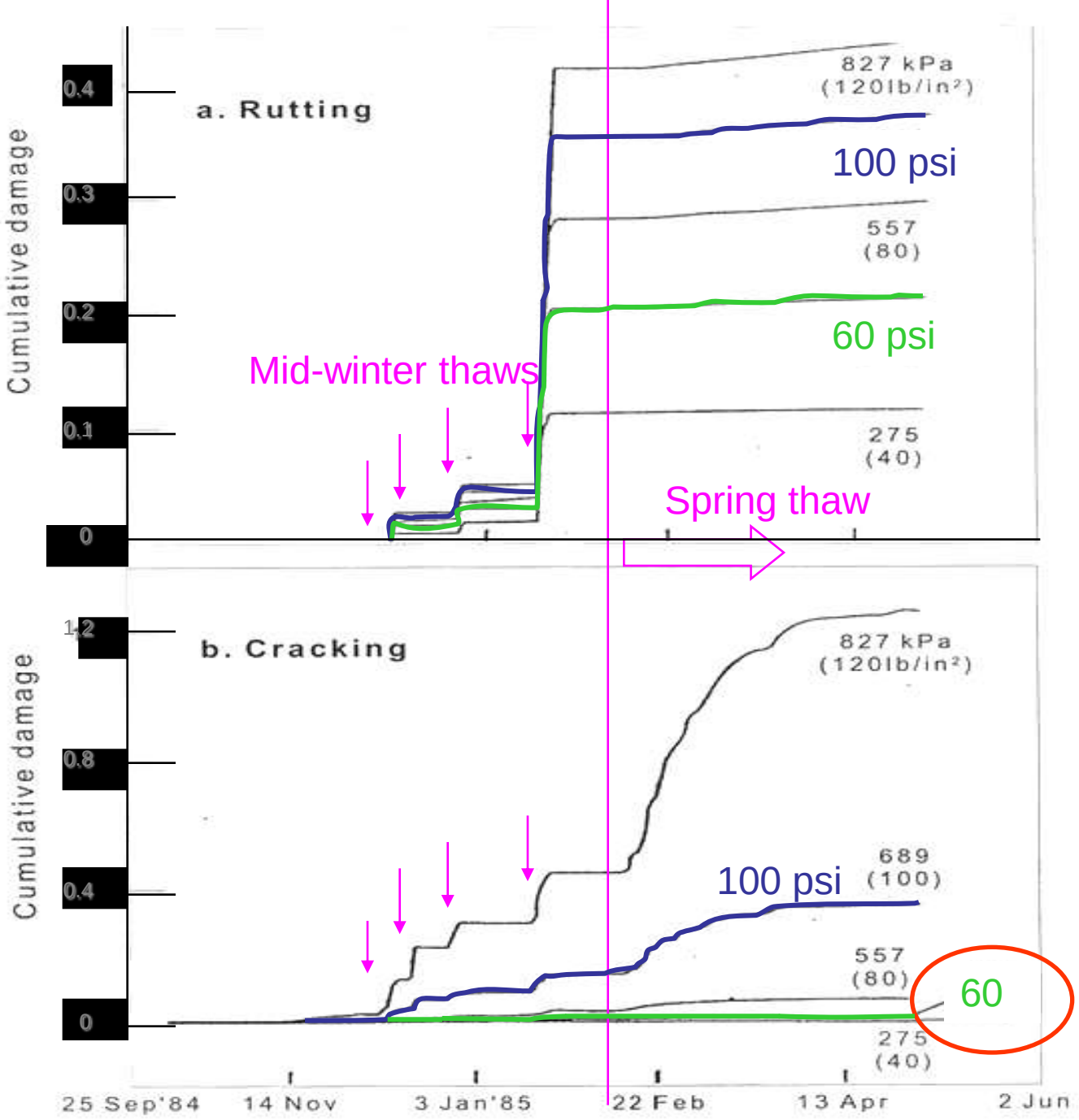
  Slower rutting, less washboard, less aggregate breakdown, less erosion, healing, less fatigue cracking in A.C. surfaces
- Reduced structural requirements

  Thinner base layer needed
- Less environmental impact

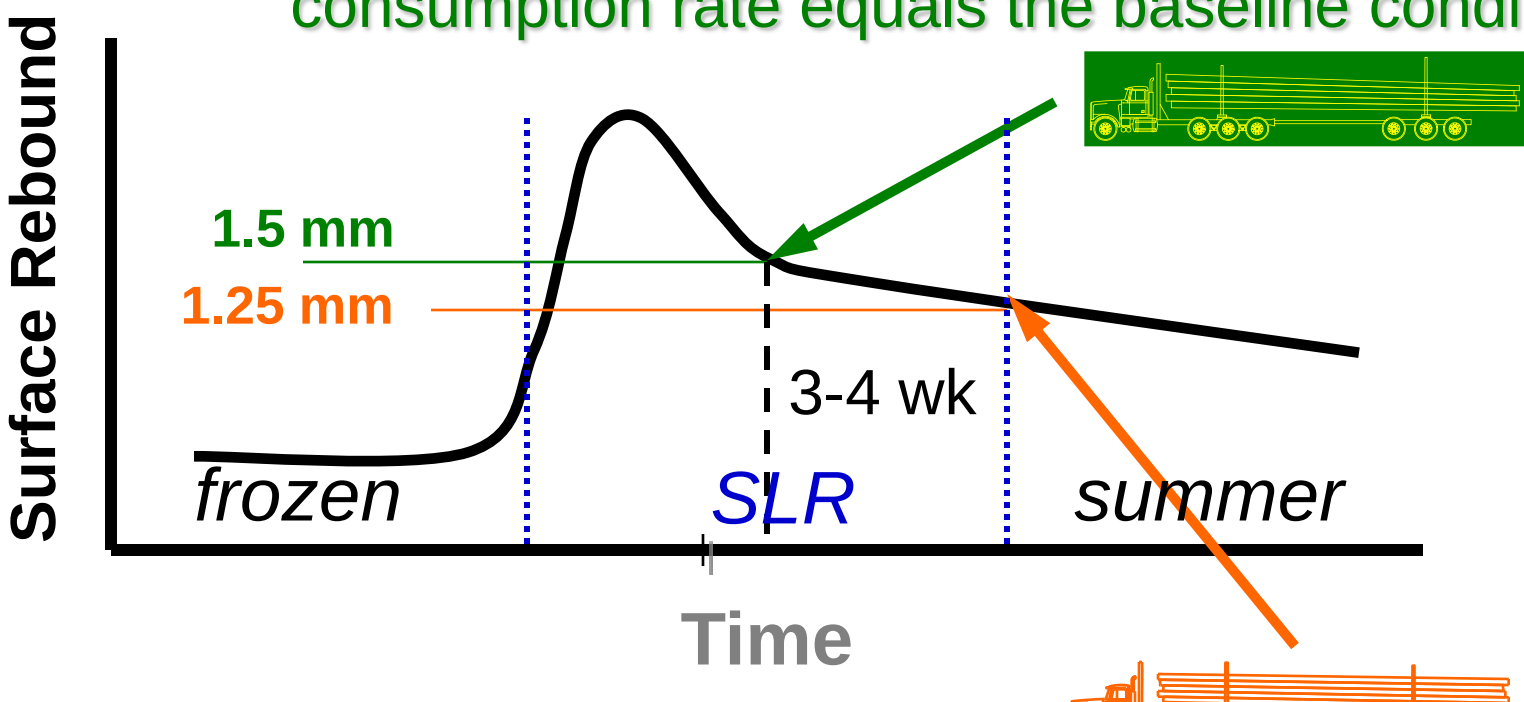
  less dust, less sediment, less metal
- Longer haul season

Cumulative damage at the end of one winter/spring season as a function of tire pressure

(from 1993 study for USFS by Kestler and Berg)



Road friendly trucks start when their road consumption rate equals the baseline condition



Road consumption rate from least friendly legal truck at end-of-SLR period is the baseline condition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Typical New Zealand Log Truck 44 Tonnne GCM 22m Long