

Buffer zone efficiency under ploughing, direct drilling and grazing in boreal conditions

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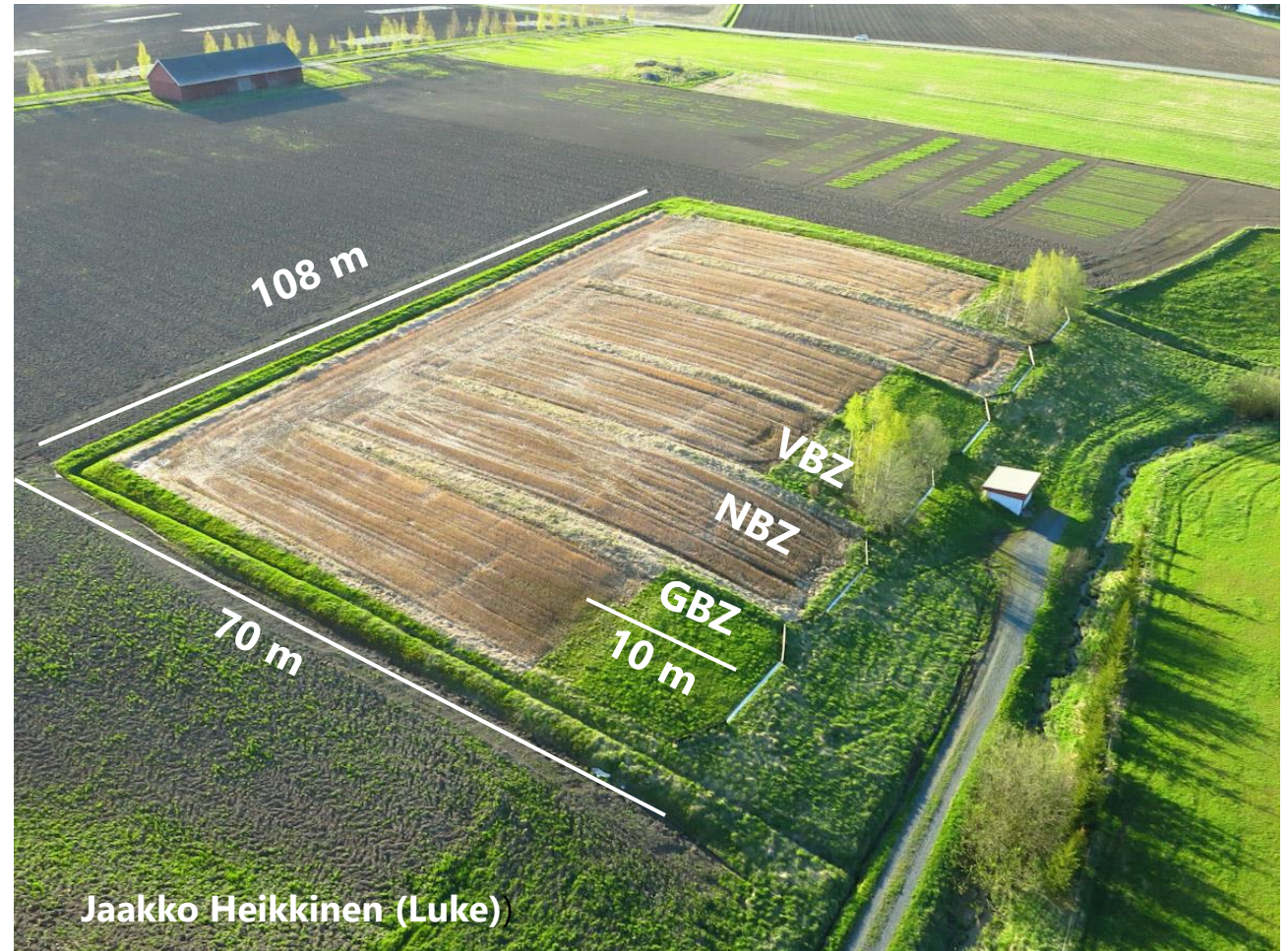


Lintupaju experimental field

Treatments:

- **N**o buffer zone (NBZ)
- **G**rassed buffer zone (GBZ)
- **V**egetated buffer zone (VBZ)

- Autumn ploughing 1991–2001
- Pasture 2003–2005
- Direct drilling 2006–2021
- Pulp mill sludge + tillage in Sept. 2021
- Direct drilling Oct. 2021–Dec. 2023

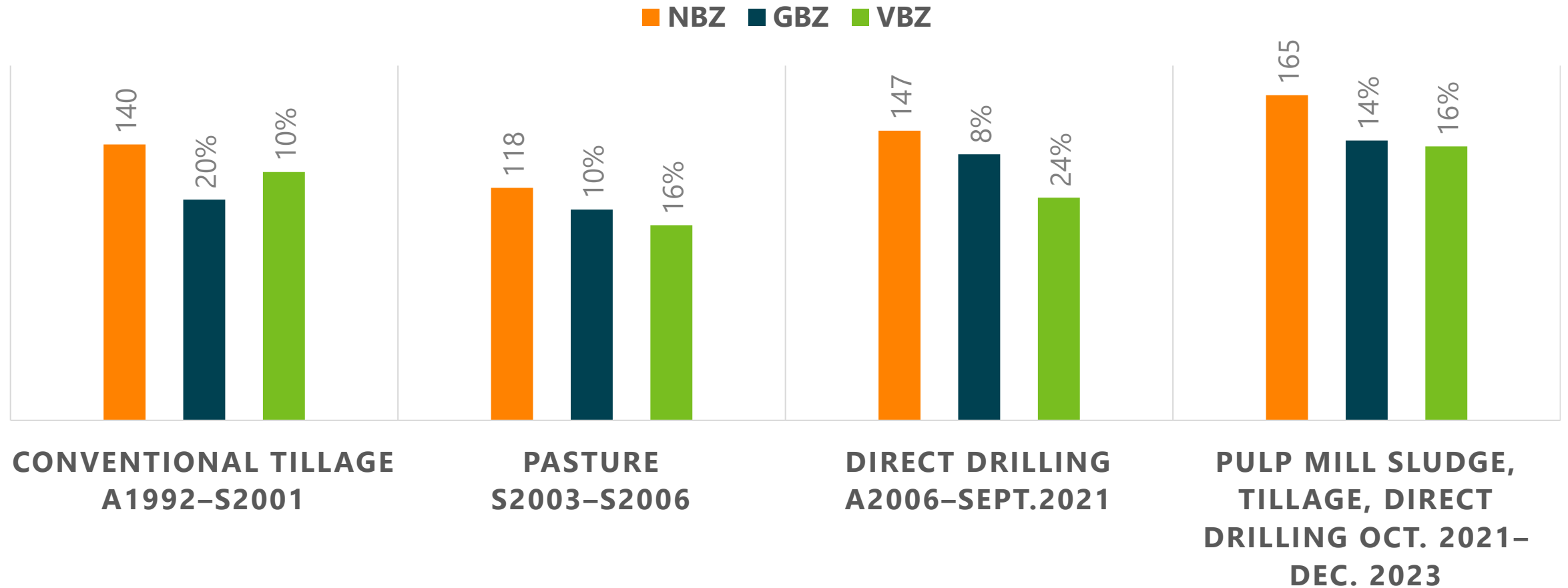


Sisältö

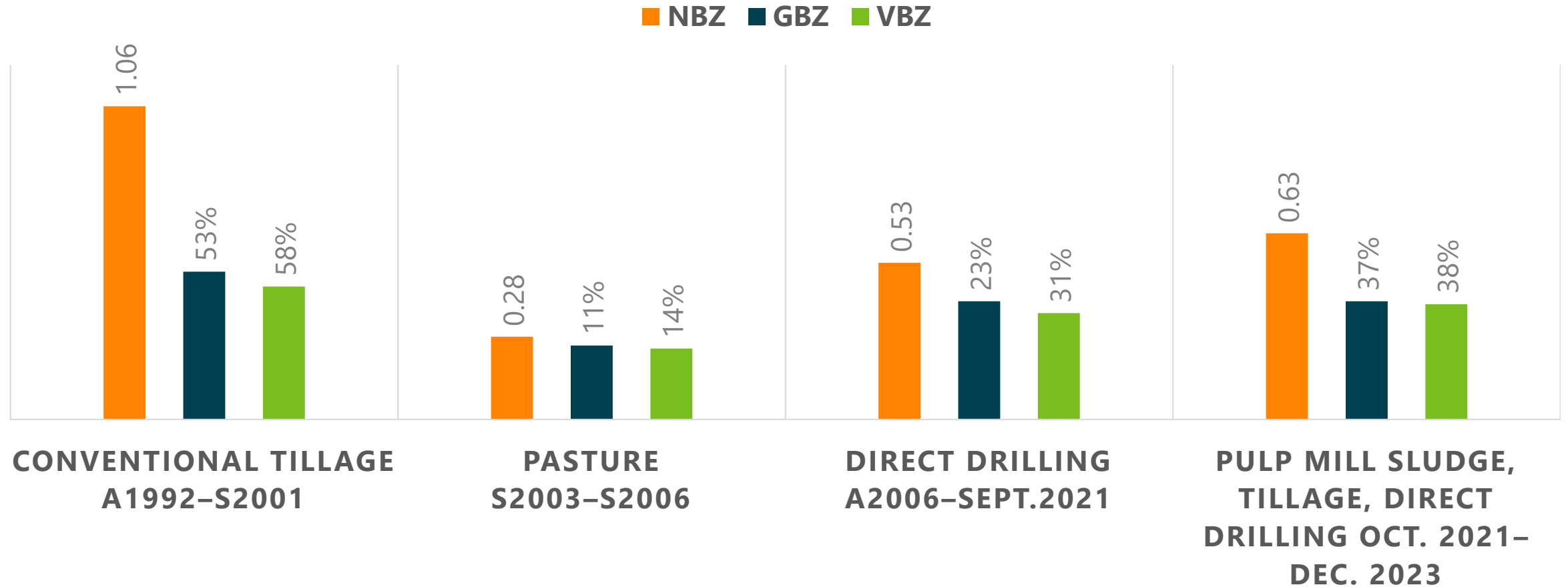
- Lintupaju experimental field
- Results
 - Surface runoff
 - Erosion
 - Particulate P
 - Dissolved reactive P
 - Total P
- Summary
- Further results



Surface runoff, mm ha⁻¹yr⁻¹

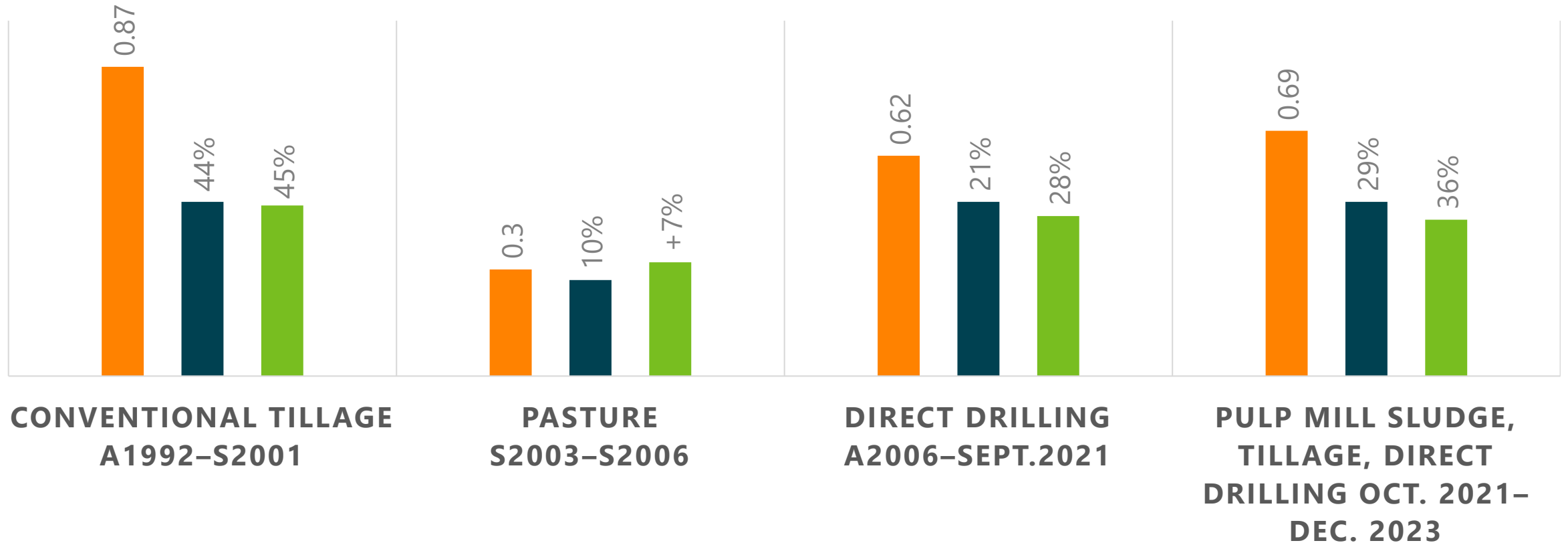


Total solids, t ha⁻¹yr⁻¹ (Erosion)

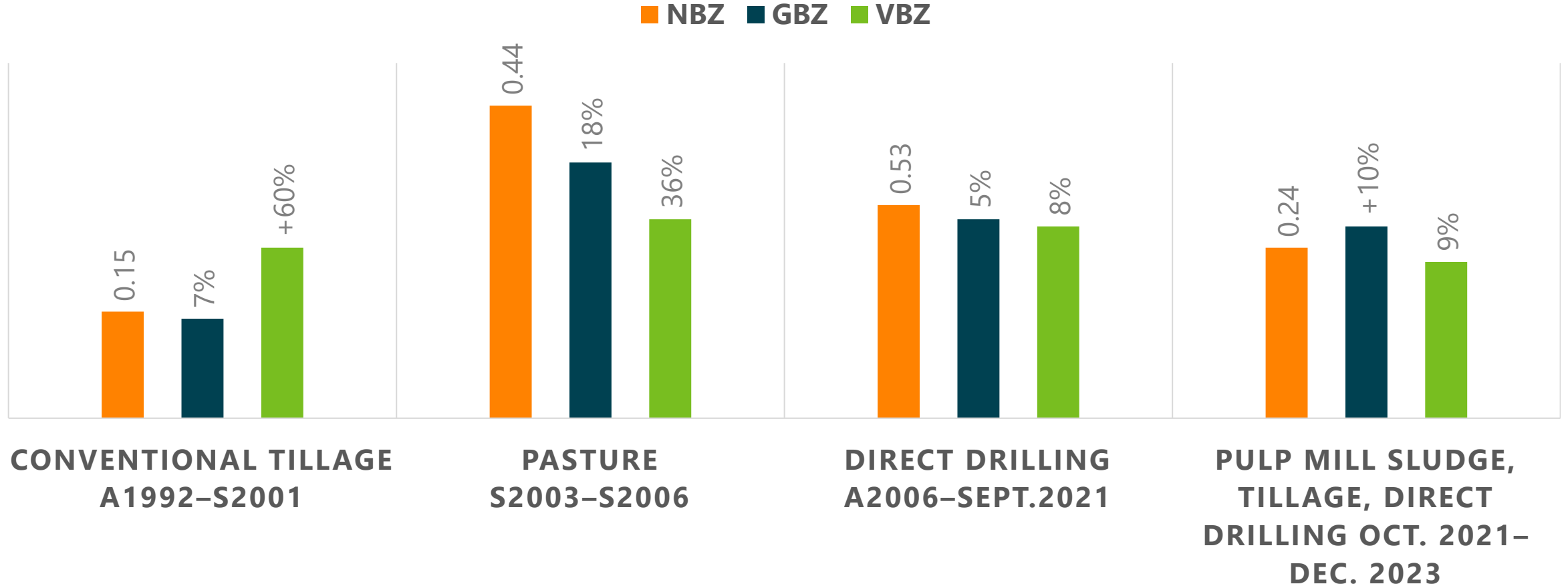


Particulate phosphorus, kg ha⁻¹yr⁻¹

NBZ GBZ VBZ

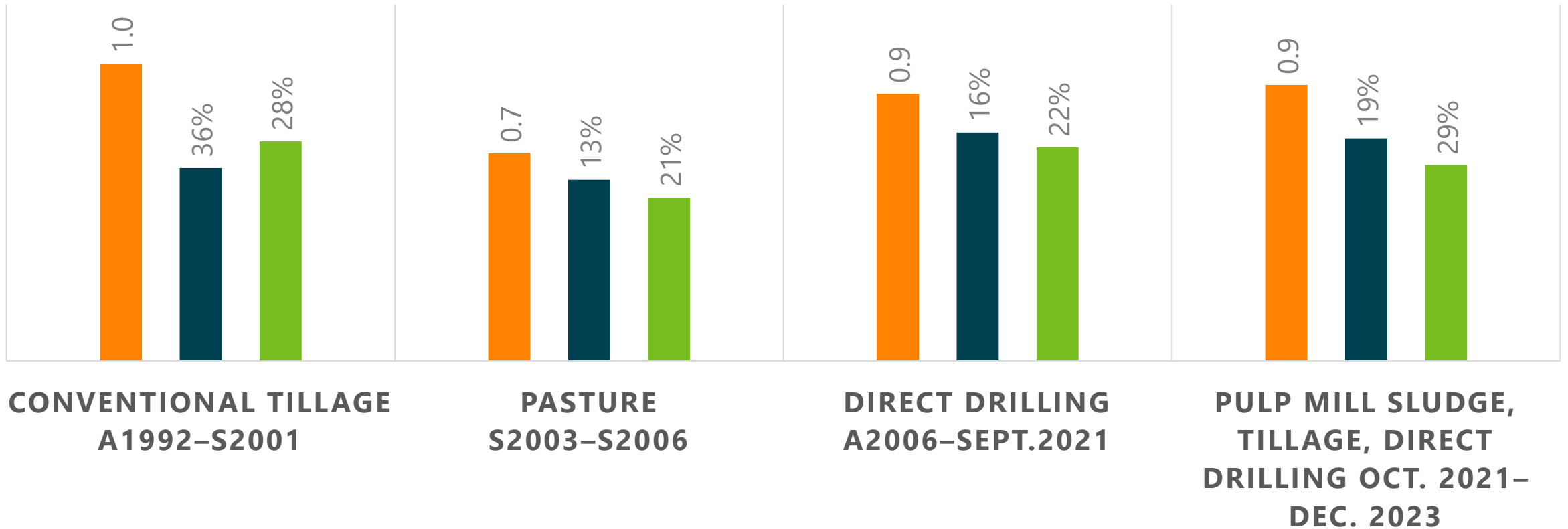


Dissolved reactive phosphorus, kg ha⁻¹yr⁻¹



Total phosphorus, kg ha⁻¹yr⁻¹

■ NBZ ■ GBZ ■ VBZ



Buffer zones are needed...



- BZs effectively control erosion and retain particle P in ploughed/tilled soils.
- To decrease dissolved reactive P cut the vegetation and remove the mown grass.
- Trees and grass together decrease surface runoff better than grass alone.
- A large part of sediment is transported through drainage pipes, which are not affected by BZs.
- Results will be used in modelling work.



Further research

- How to decrease liberation of dissolved reactive P from BZs during freezing and thawing events?
- How to improve the functioning of BZs in winter as the climate warms and rainfall increases?
- Functioning of old BZs. Can BZs be renewed?
- How new types of BZs work in boreal conditions?
- Should there be BZs in other parts of the parcel than between the parcel and the watercourse?
- The use of soil amendments (gypsum, structure lime, or pulp and paper mill sludges) in controlling erosion and transport of sediment and P in drainage water.





Thank you for your attention!



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