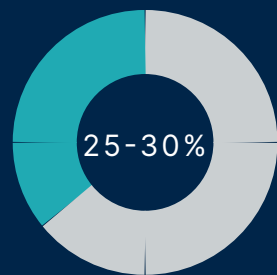


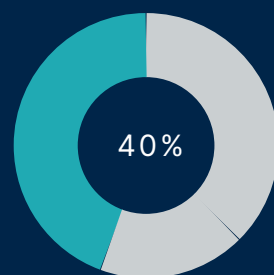
# Ballast Fouling

## Critical Infrastructure Insight

### Key statistics



**Track Stability Impact:**  
Can reduce track stability by  
up to **40%**



**Maintenance Frequency:**  
Increases maintenance cycles  
by **25-30%**

**\$2.5  
BILLION**

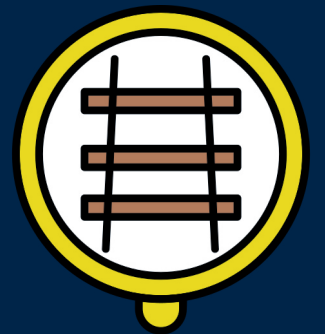
**Annual Cost to Railways:**  
Estimated \$2.5 billion globally

### Root Causes

- Mud pumping
- Train-generated debris
- Ballast material degradation
- Environmental runoff
- Wind-blown particulates

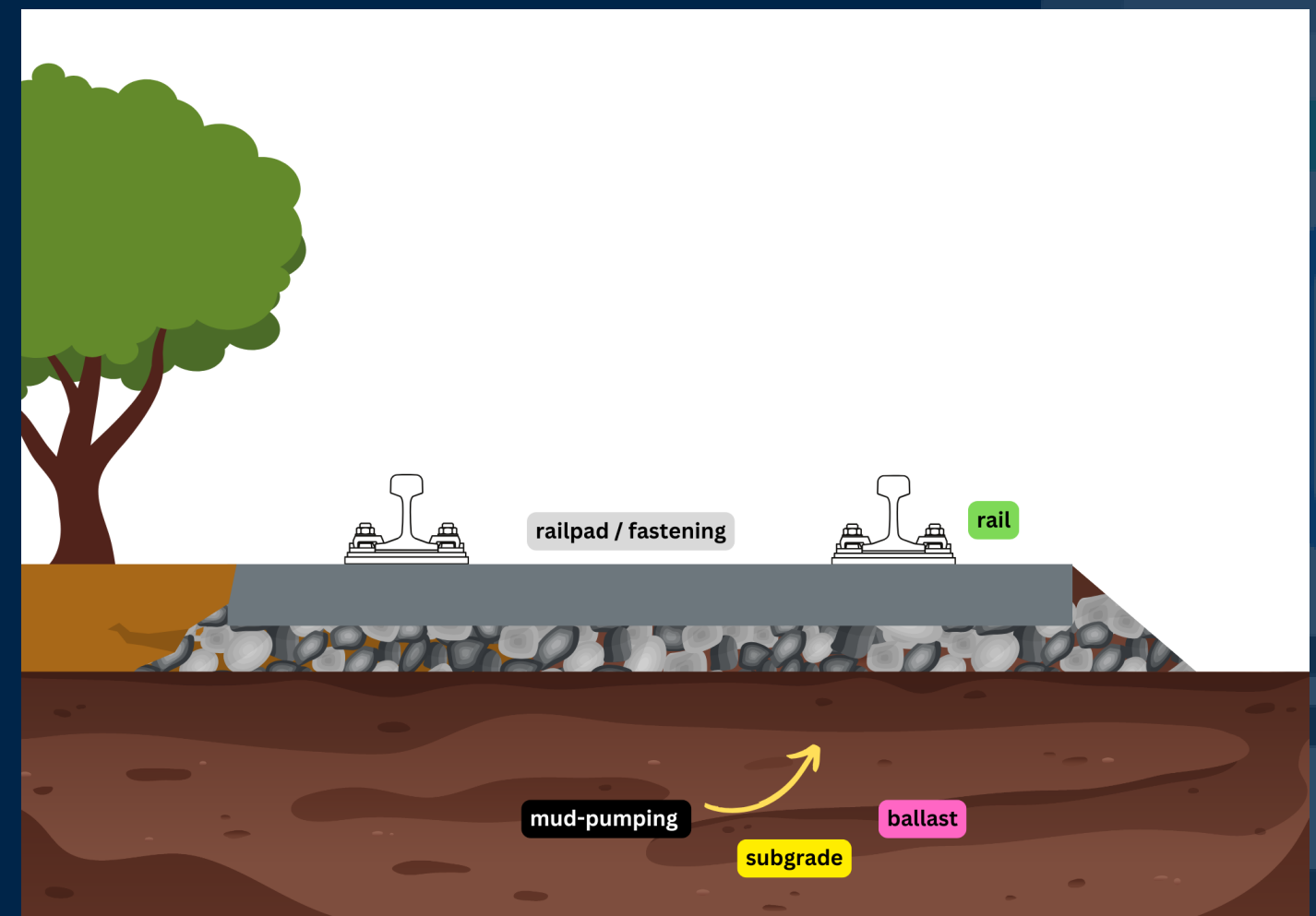
### Detection Challenges

- Visual inspection limitations
- Hidden subsurface deterioration
- Complex moisture interaction dynamics



### Mitigation Strategies

- Regular track inspections
- Advanced SAR monitoring
- Proactive drainage management
- Ballast cleaning and replacement programs



\* For more information, contact our remote sensing experts at Geofem.