



# From Field Metrics to Decisions and Refinements

*Scalable reclamation portfolio monitoring, analysis, and refinement*

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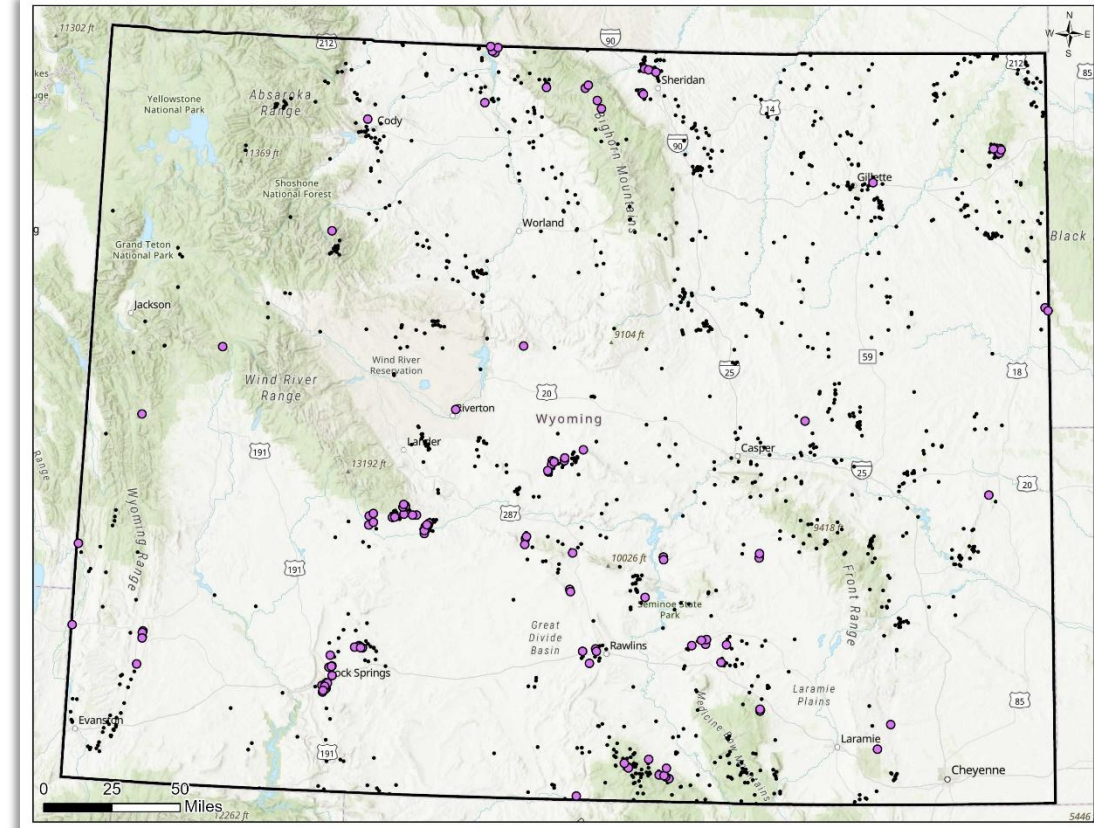
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# Why This System Was Needed

- Large reclamation portfolios
- Requirement for **consistent, repeatable, and defensible** monitoring/reporting
- Monitoring supports:
  - **portfolio screening**
  - **adaptive management**
  - **certification decisions**
  - **program learning**
- We are generating an input/output data pool, but the goal is not more data — it's **decision optimization**.

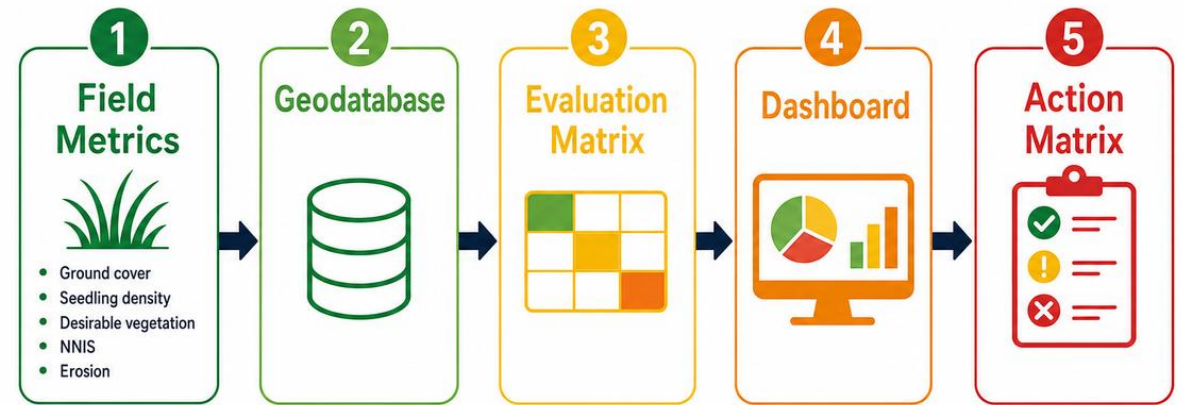




# The Framework: Program Architecture

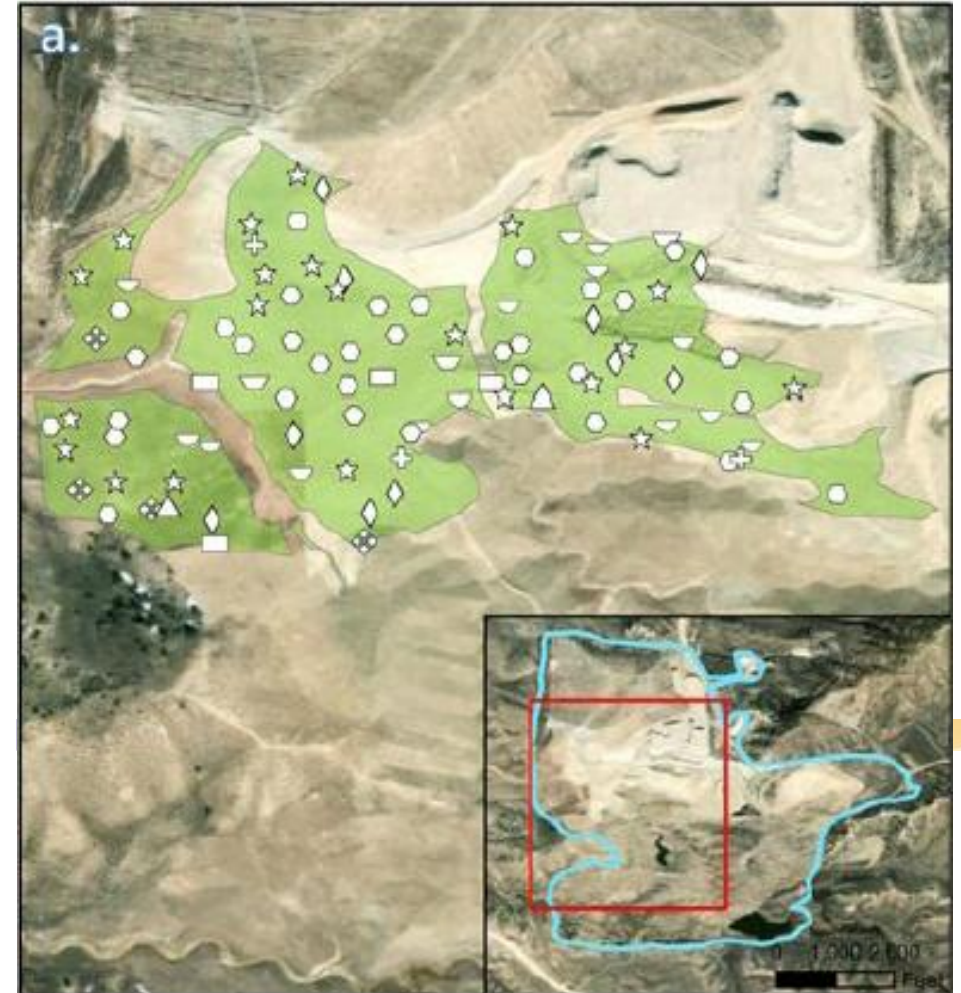
- **System modules:**
  - Standardized field monitoring (VMP-based)
  - Monitoring/Admin Geodatabase
  - Evaluation Matrix
  - Action Matrix
  - Dashboards (Site-scale)
  - Reporting
  - Dashboard Communication (Portfolio-scale)
- Built to support adaptive management and expedited “certification”

## Monitoring Workflow



# Field Metrics that Drive the System

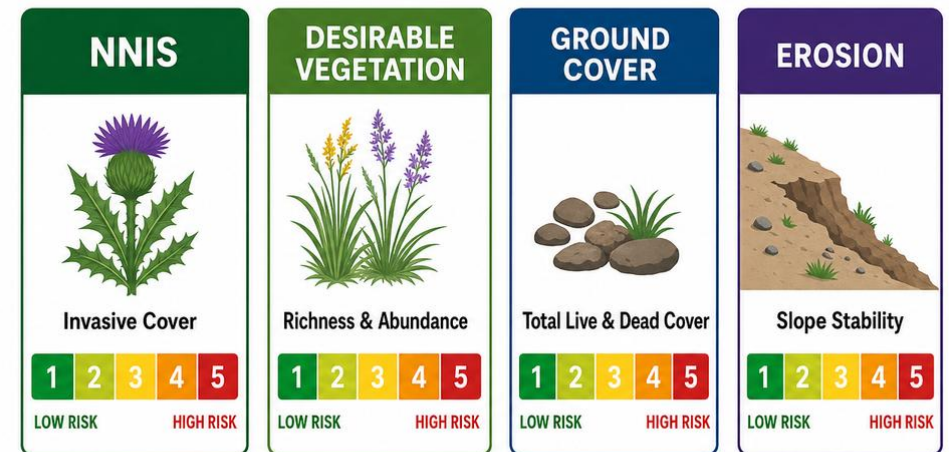
- Repeated, standardized field metrics include:
  - **Ground cover**
  - **Seedling density** for first-year sites
  - **Desirable vegetation**
  - **Non-native and invasive species**
  - **Erosion**
  - Optional **habitat** metrics
- Captures current site condition and reclamation trajectory



# Evaluation Matrix: A transparent, rules-based scoring system

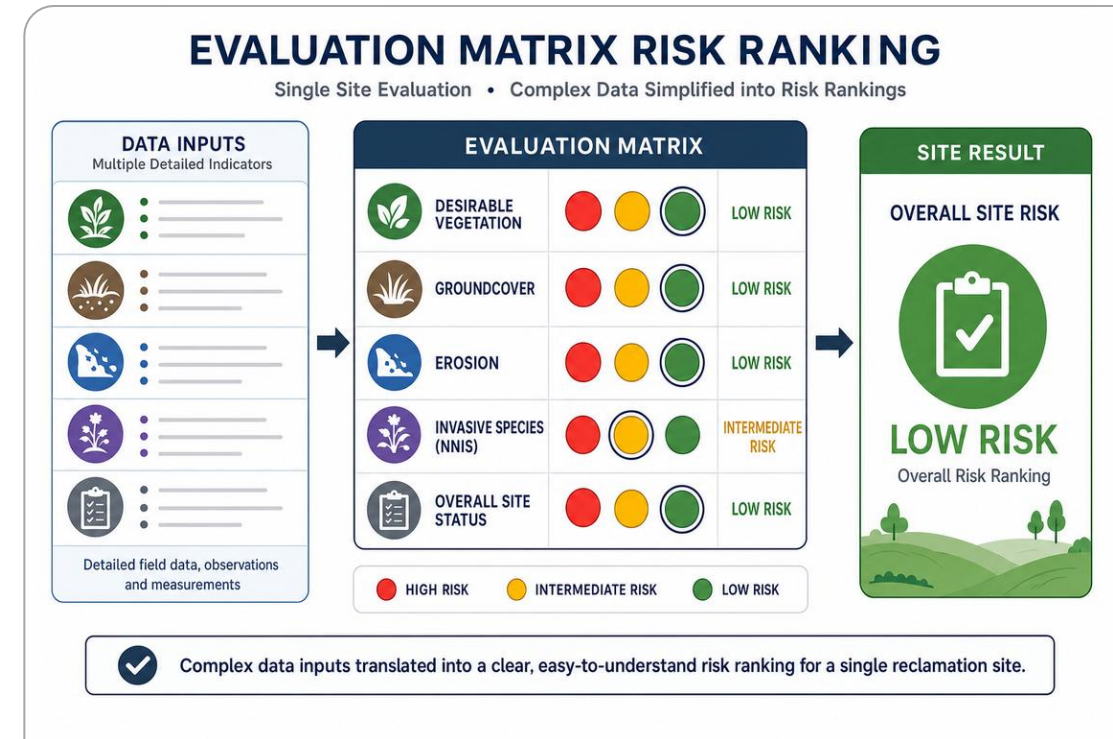
- **Ground cover**
  - Weighted by type/functional group contribution to erosion resistance
- **Erosion**
  - Manually assigned based on geomorphic observations
- **Desirable species**
  - Weighted by species desirability and abundance
- **NNIS**
  - Combines noxious weed class and non-native cover
  - Higher-risk invasive classes override lower scores
- **Overall**
  - Each site's overall ranking is derived from these component scores

## Evaluation Matrix



# Evaluation Matrix – Turning Metrics into Risk Rankings

- Metrics scored on a **1–5 risk scale**
- Rankings are translated into **risk levels**
- Thresholds vary by site age / growing seasons since reclamation



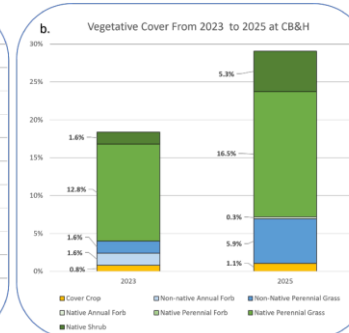
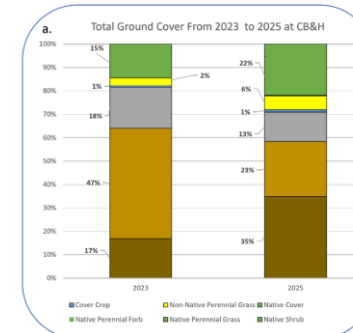
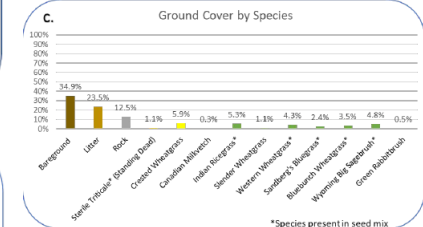
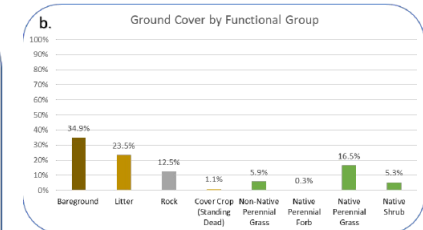
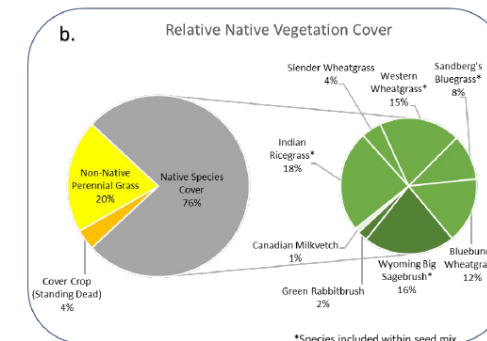
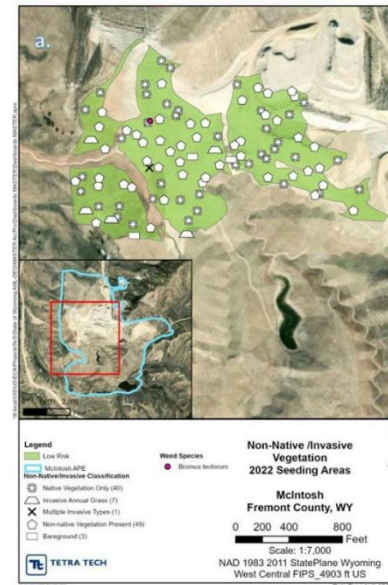


# Dashboard-driven Reporting:

- **Dashboards include:**
  - Overall Site Assessment
  - Ground Cover
  - Desirable Vegetation
  - Invasives / Non-Natives
  - Erosion Control
- **Traffic-light dashboard system:**
  - green
  - lime green
  - yellow
  - orange
  - red
- Non-green dashboards prompt review and discussion of root cause and corresponding action

**Table 3: CB&H Mine Reclamation Risk Summary – Year 3**

| Dashboard                   | Ranking       | Ranking Value | Dashboard    |
|-----------------------------|---------------|---------------|--------------|
| Overall                     | Low Risk      | 2             | Figure 2     |
| Ground Cover                | Low Risk      | 2             | Figure 3 & 4 |
| Desirable Vegetation        | Low Risk      | 2             | Figure 5     |
| Non-native/Invasive Species | Low Risk      | 2             | Figure 6     |
| Erosion                     | Very Low Risk | 1             | Figure 7     |



# Geodatabase: Data Architecture Makes the System Scalable

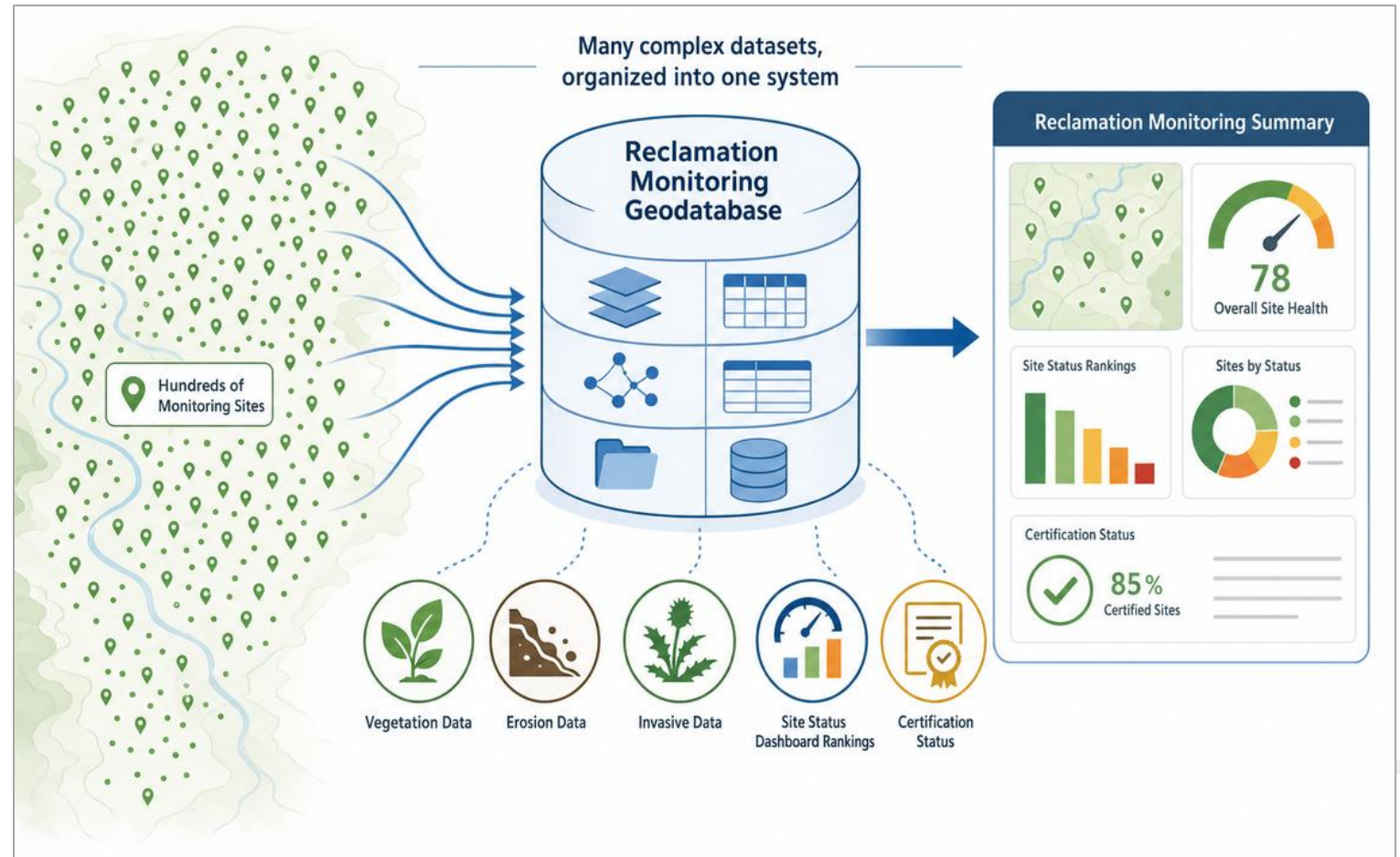
- Master monitoring geodatabase stores:

- site boundaries
- Reclamation inputs
- VMP photo collection
- SamplePoint data
- weed and erosion observations
- dashboards
- wildlife data
- Certification status

- Uses:

- **domains**
- **contingent values**
- attachments
- relationship classes

- Supports field data collection, queries, reporting, and historical comparison





# Action Matrix: Risk Ranking Becomes Action Guidance

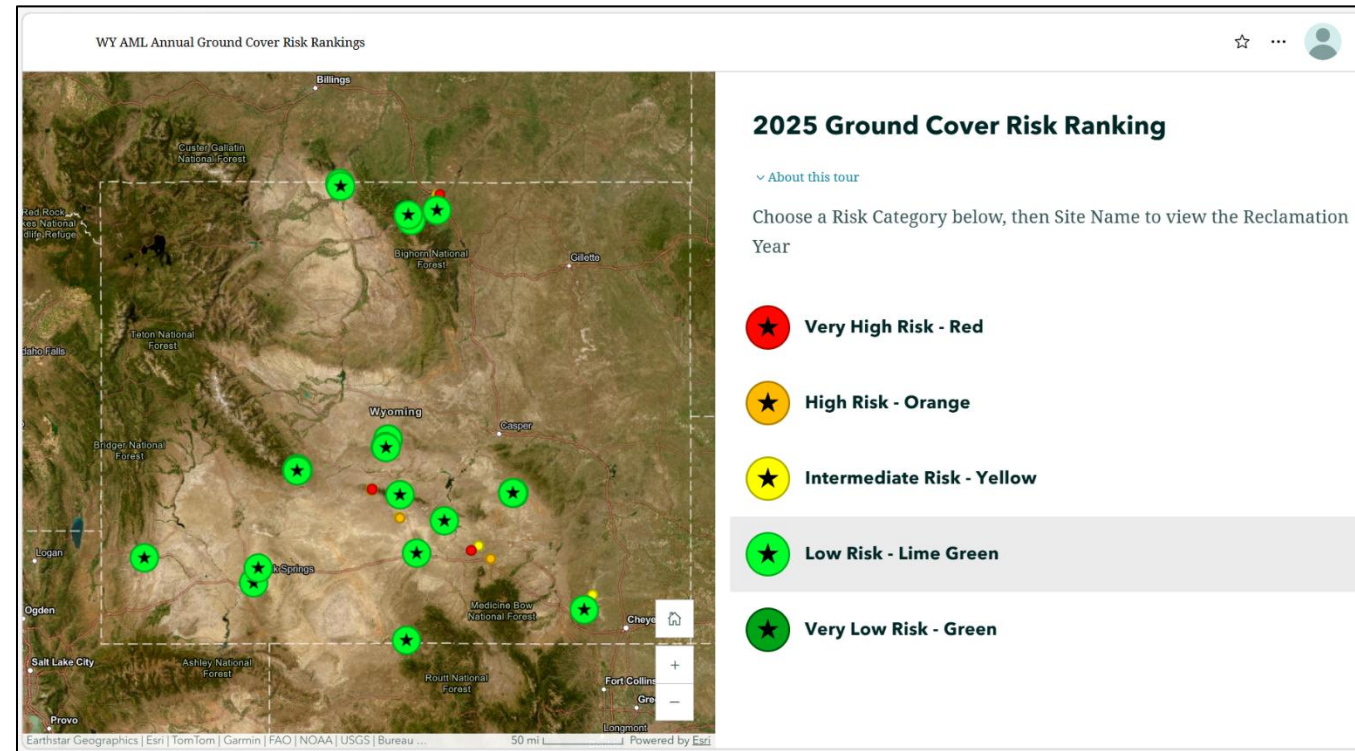
- Dashboard rankings feed the **Action Matrix**
- The Action Matrix guides:
  - continued monitoring
  - targeted management
  - intensive corrective action
  - certification consideration
- The system supports both:
  - **adaptive management**
  - **certification of successful reclamation**



# Takeaways

## What this system delivers

1. **Consistency** through standardized metrics and scoring
2. **Defensible decisions** with transparent thresholds and supporting evidence
3. **Portfolio-wide Performance Tracking** through a single overall dashboard
4. **Continuous refinement** through cumulative monitoring and action tracking
5. **Scalability** through geodatabase and dashboard architecture







# Thank You!

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