



An Ecologist's Perspective on Mitigation Monitoring

Bob Siegfried, Sr. Project Manager



Typical Wetland Mitigation Monitoring

Typical Performance Standards

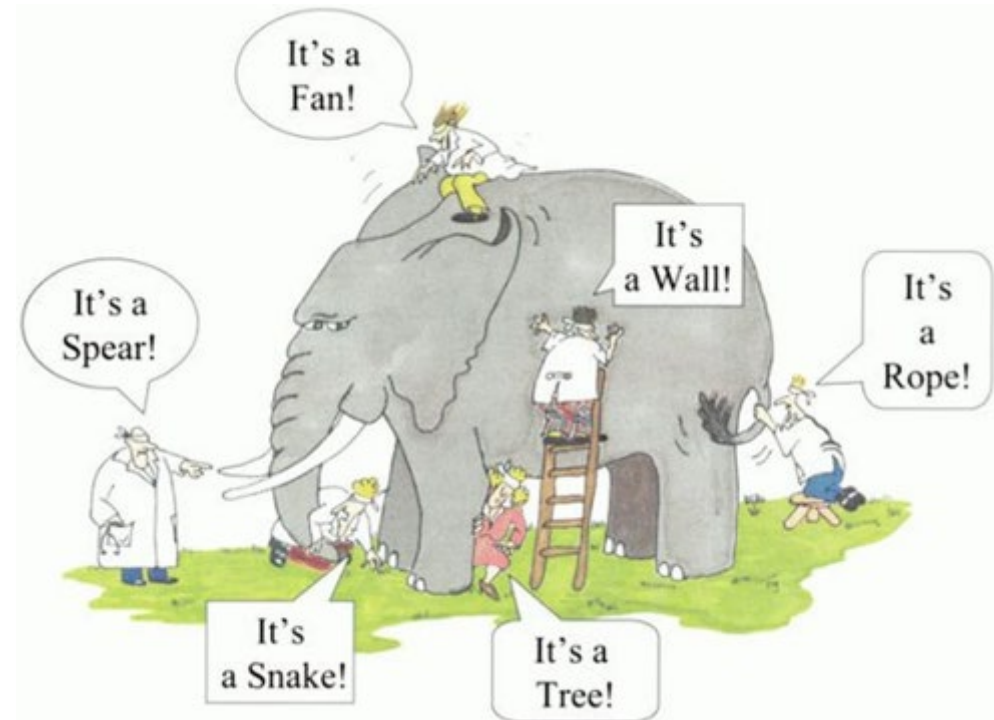
- **Vegetation Monitoring**
 - % Cover
 - Wetland & Upland Vegetation
 - Invasive Vegetation
 - Stem Counts if PFO
- **Wetland Hydrology**
 - # Of Days With Saturation
- **Soils**
- **Ground Level Photos**
- **Other Standards**

Typical Monitoring Methods

- **Vegetation Plots**
 - 1 Meter Plot For % Cover
 - 1 Meter Plot For Herbaceous Species
 - 10+ Ft Plot Of For Woody Stems/Acre
- **Monitoring Wells**
 - # Wells Per Acre
 - Plot Of Daily Data Time Series

Drawbacks of Traditional Mitigation Monitoring

- **Not Holistic**
 - Plots, Ground Level Photos And Wells Monitor < 5% Of Site
 - No Systemwide Understanding
- **Not Transparent**
 - >90+% of Site NOT Evaluated
 - Problems Easy to Miss or Hide
- **Not Efficient**
 - 100s Of Wells, Veg. Plots, Etc.
 - Difficult To Review
 - Not Focused On Critical Information



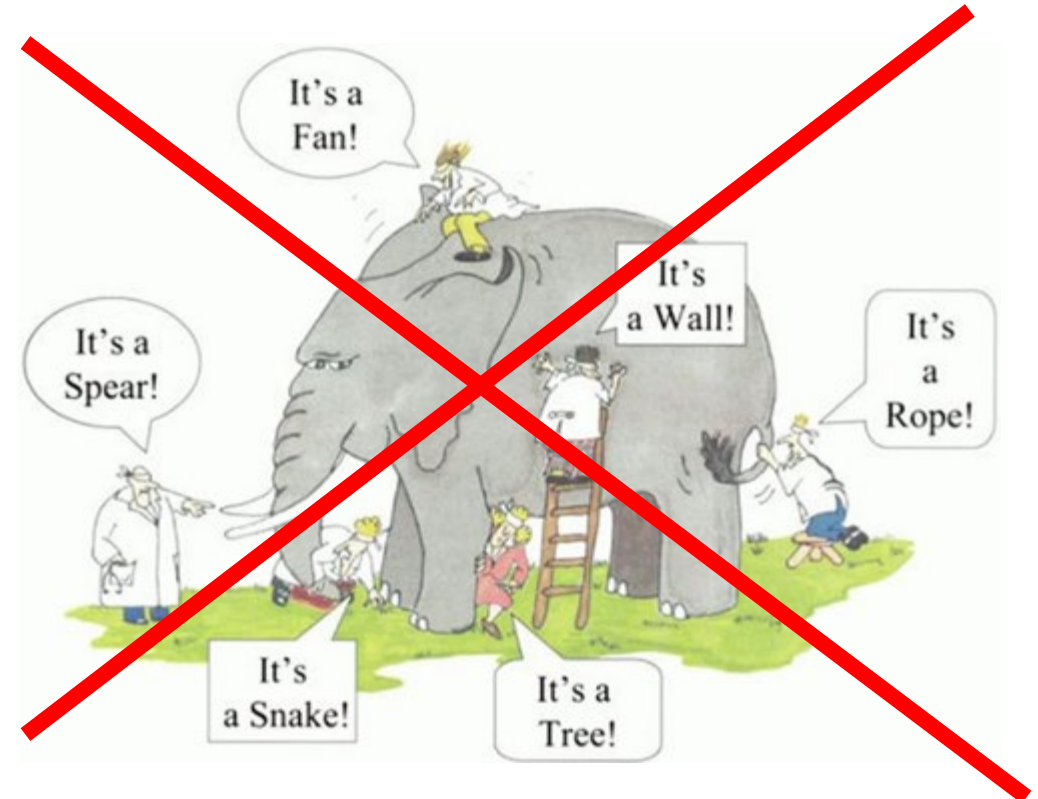
1900s Approach To Sampling A Large Site

New Approach to Mitigation Monitoring

Three Underlying Principles

- **Holistic**
 - Focus on Big Picture
 - Evaluate Entire Site
 - Understand System
- **Transparent**
 - Easy To Interpret
 - Nothing to Hide
 - Identify Trends – Good and Bad
- **Efficient**
 - Collect Detailed Data on Problem Areas
 - Less Review Time

“



New Approach to Mitigation Monitoring

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“New” Technologies

- **Aerial Imagery**
 - Readily available
 - Adaptable to Larger Sites
- **Real Time Sensors**
 - Measure Processes Tied to Ecology
 - Monitoring Wells and Stream Gages
 - Temperature
- **Biological Assessments**
 - Habitat Assessments
 - Traditional and eDNA Sampling

“New” Tools for Mitigation Monitoring

Typical Performance Standards

- **Vegetation Monitoring**
 - % Cover
 - Wetland & Upland Vegetation
 - Invasive Vegetation
 - Stem Counts
- **Wetland Hydrology**
 - # of days with Saturation
- **Soils and other Standards**

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Percent Cover from Aerials

Answer Basic Question –
Is Site Vegetated &
Stable



August 2022



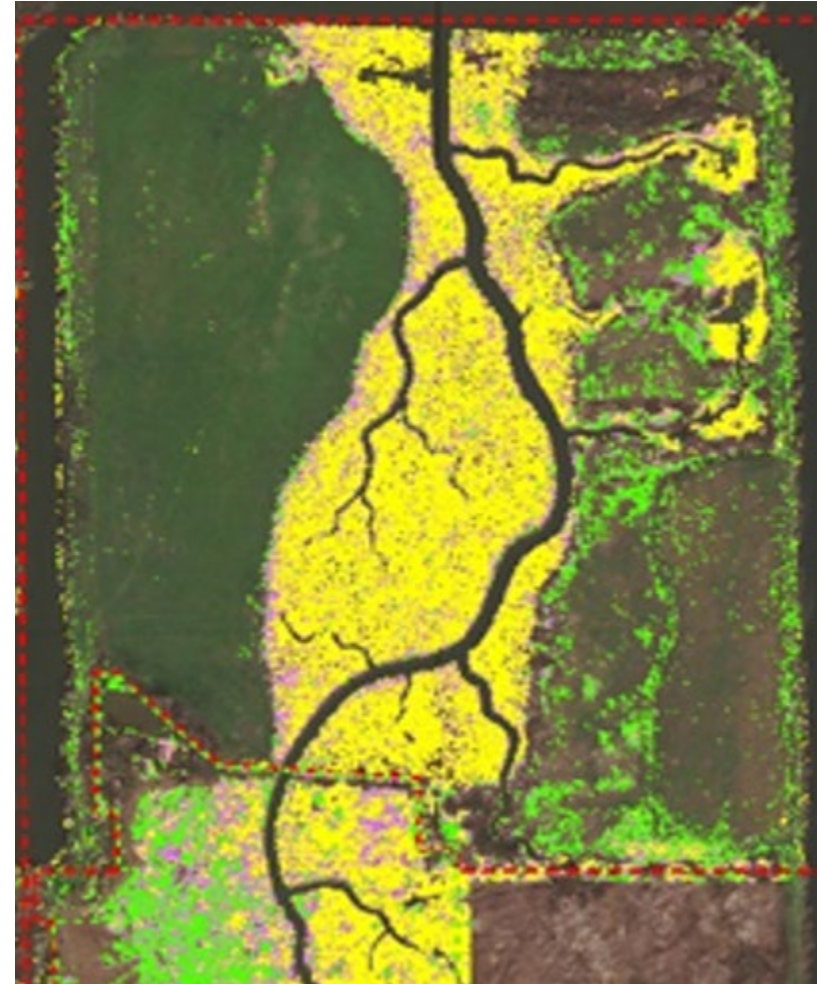
October 2022

Mapping Wetland & Upland Vegetation

Monitoring with Aerial Imagery

- **Holistic and Transparent**
 - Acquire Imagery of Entire Site
 - Collect Classification Data
 - Source of Species Data
 - Map Communities using Image Analysis Software
- **Effective / Efficient**
 - Repeatable Year To Year
 - Quantifiable Allowing Trend Detection
 - Effective Identify Problem Areas

Tidal Marsh

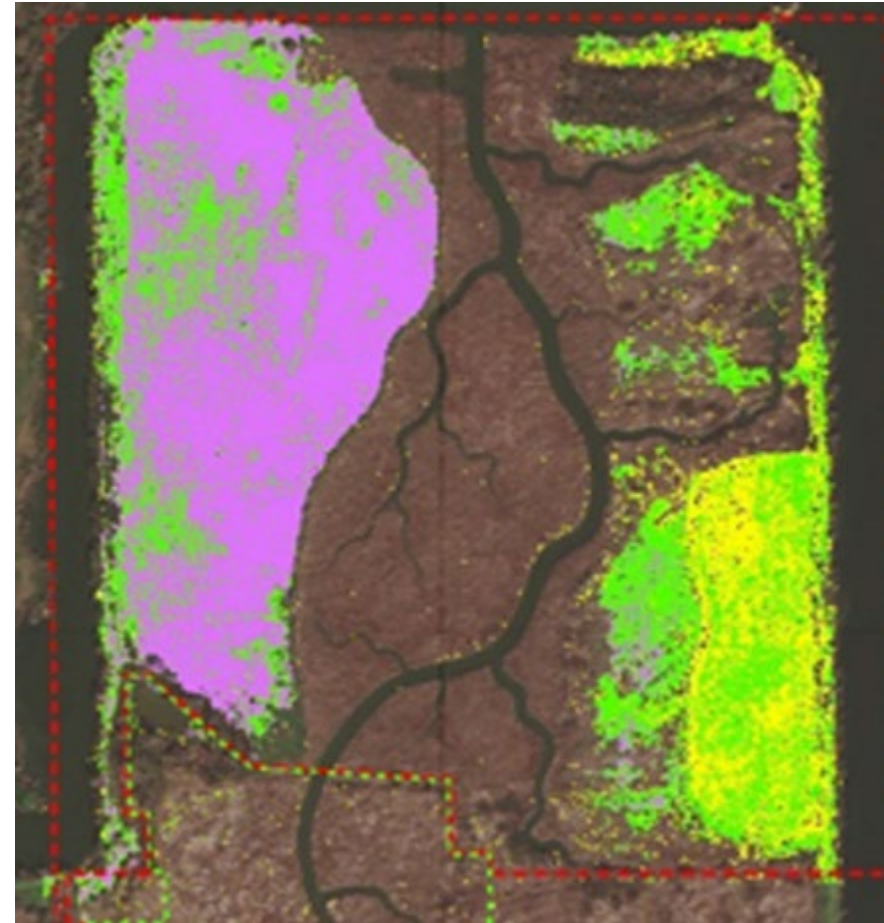


Mapping Invasive Species

Monitoring Invasives with Aerial Imagery

- Field Identify Invasive Species
- Collect Classification Data
- Produce Detailed Maps
- Track Trends over Space and Time
- Improved Data Quality and Trend Detection
- Reduce Field Labor & Bias during Sampling
- Reallocate Labor to Improve Control Programs

Invasive Species Mapping



Monitoring Hydrology – Real Time Sensors

Traditional Monitoring

- Water Level Loggers, Downloaded Manually A Few Times Per Year
- Blind to What Is Happening Onsite

Real Time Monitoring

- Wireless Upload Data To Dashboard
- Reduced Human Error In Data Collection
- Refocus Labor From Collection To Analysis
- Know When There Are Floods, Beaver, etc.



HOBO | Thought Leader Series
Data Loggers | Webinar

Real-Time Water Level Data for Wetland & Stream Mitigation Monitoring

Want to save time & money? Join our FREE webinar, presented by ecology expert Bob Siegfried. Discover how using real-time water level data for wetland & stream mitigation monitoring increases data reliability, lowers data collections costs, and improves understanding of site performance.

Hosted by Onset & presented by **Bob Siegfried, Senior Project Manager**
Resource Environmental Solutions
Thu, Apr 25, 2024 at 2pm EST / 11am PST

The proof is in the data



Challenges of “New” Monitoring Technologies



Building Trust In The
New Technologies



Modifying
Performance Standards



Modifying Mitigation
Banking Instruments -
Approval Delays



Data Delivery – Size Of
Data, Images, Etc.

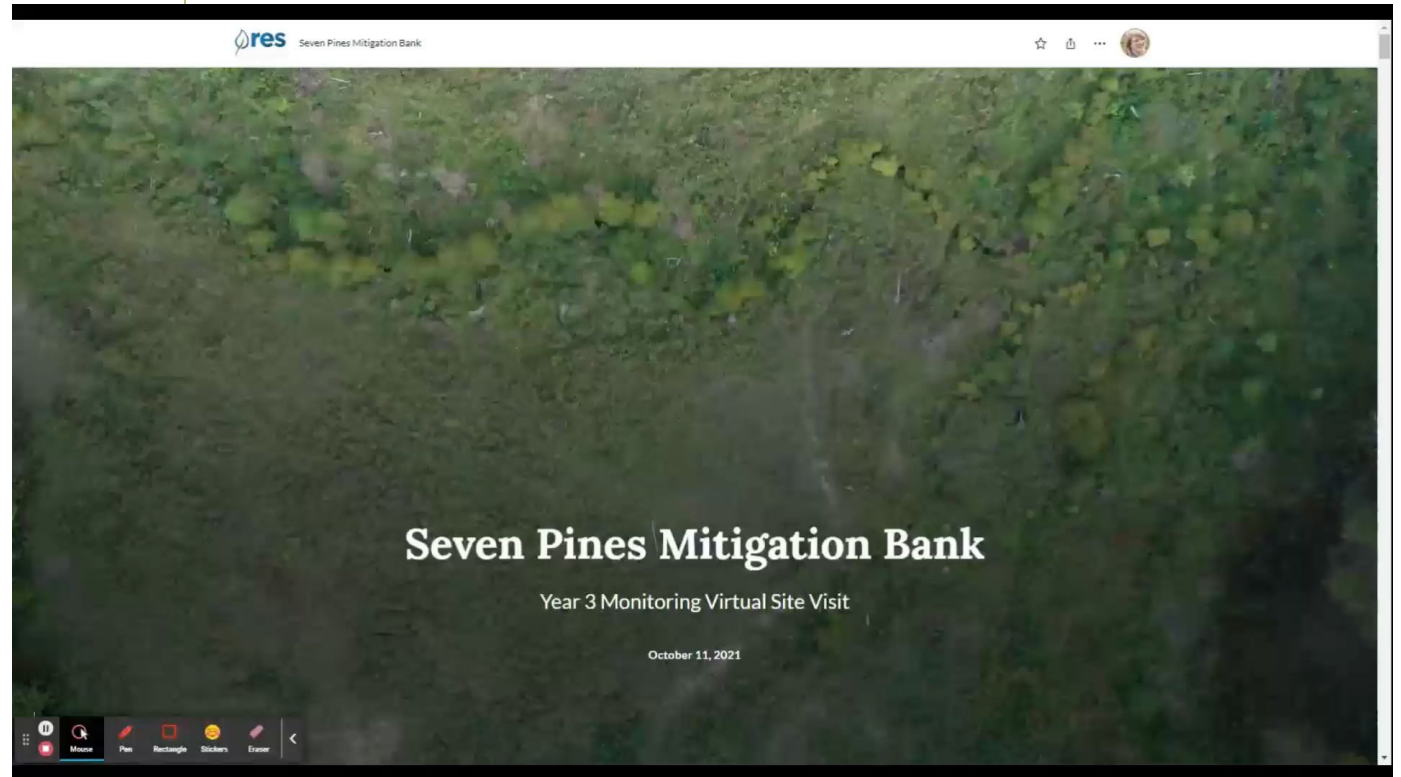
Data Delivery Challenges

Challenges

- Aerial Imagery Produces Large Data Sets
- Difficult To Use In PDF Reports
- Difficult To Transmit To COE

Solutions

- Access to Real-Time Data Dashboards
- GIS StoryMaps
 - Integrating Data Types
 - Engaging with Viewer
- Google "Streetview" Type Products



Performance Monitoring for Mitigation



Holistic – Provide big picture understanding of system, move away from point focused data collection



Transparent – Performance of the site should be clearly interpreted from the data. Bad performance can not hide. Focus on identification of trends (good or bad)



Efficient – Focus high intensity data collection on problems areas and corrective actions, less review time

Questions? / Contacts

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